

RESOURCE MANAGEMENT PLAN



Puente Hills Landfill
Native Habitat Preservation Authority

Submitted to:
Puente Hills Landfill Native Habitat Preservation Authority
7702 Washington Avenue, Suite C
Whittier, CA 90602
(562) 945-9003

Prepared by:

LSA Associates, Inc.
20 Executive Park, Suite 200
Irvine, CA 92614
(949) 553-0666

LSA Associates, Inc.
157 Park Place
Point Richmond, CA 94801
(510) 236-6810

LSA

Adopted July 26, 2007

ACKNOWLEDGMENTS

Board of Directors

Chairman Bob Henderson
Vice Chair Barbara Fish
Director Dickie Simmons
Director Steve Maguin
Alternate Director Chan
Alternate Director Hughes
Alternate Director Newcomer
Alternate Director Pederson.

Citizens Technical Advisory Committee

Chairman Bud Welch*
Vice Chair Michael Hughes*
Member David Rodriguez
Member David Cowardin*
Member Alex Moisa
Member Chuck Hanson
Member Bill McDermott*
Member Steve Garcia
Member Suzann Chung
Member Shelley Andros* (former)

**Indicates Trails Subcommittee.*

Habitat Authority Staff

Andrea Gullo, Executive Director
Amy Henderson*, (former) Resource Ecologist
Meaghan O'Neill, (former) Park Interpreter

Special Thanks:

The Habitat Authority would like to recognize other contributors to the preparation and creation of the document: Jim Donovan*, AICP, National Park Service - Rivers, Trails and Conservation Assistance Program; Deputy Chief Ranger Kenn Hughes*, Mountains Recreation and Conservation Authority; Biological Workshop participants: Dr. Ray Sauvajot, National Parks Service; Trish Smith, The Nature Conservancy; Dan Cooper, National Audubon Society; Dr. Cheryl Swift, Whittier College; Peter Bloom; Lisa Lyren, U.S. Geological Survey; Dr. Travis Longcore, The Urban Wildlands Group/USC; Steve Boyd, Rancho Santa Ana Botanical Garden; and Brad Henderson, CA Department of Fish and Game.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 OVERVIEW	1
1.2 VISION AND MISSION	1
1.2.1 Vision	4
1.2.2 Mission	4
1.3 PURPOSE OF THIS RMP	4
1.4 PRESERVE OVERVIEW	6
1.4.1 Location	6
1.4.2 History of Use	6
1.4.3 Acquisition History	8
1.4.4 Global and Regional Significance	9
1.4.5 Physical Characteristics of the Preserve	10
1.4.6 Use Characteristics of the Preserve	11
2.0 PRESERVE DESCRIPTION	13
2.1 GEOGRAPHICAL SETTING	13
2.2 ADJACENT LAND USES	13
2.3 PHYSICAL RESOURCES	14
2.3.1 Geology and Topography	14
2.3.2 Soils	15
2.3.3 Hydrology and Water Quality	18
2.3.4 Climate	19
2.3.5 Fire History	20
2.4 RECREATIONAL RESOURCES	24
2.4.1 Sycamore Canyon/Hellman Park	24
2.4.2 Hacienda Hills/Puma, Toyon, and Coyote Canyons	25
2.4.3 Turnbull Canyon	25
2.4.4 Worsham Canyon	25
2.4.5 Arroyo Pescadero	25
2.4.6 Hacienda Road East/Arroyo San Miguel	25
2.4.7 Powder Canyon	26
2.5 INTERPRETATION AND EDUCATION	26
2.5.1 Interpretive Panels	26
2.5.2 Kiosks	26
2.5.3 Signs	27
2.5.4 Educational Programs	27
2.5.5 Ranger Presentations	28
2.6 EXISTING FACILITIES	28
3.0 NATURAL RESOURCES	29
3.1 VEGETATION COMMUNITIES AND WILDLIFE HABITAT	29
3.1.1 Coastal Sage Scrub Communities (845 acres)	33
3.1.2 Chaparral (975 acres)	34
3.1.3 Grassland (1,224 acres)	35
3.1.4 Riparian (143 acres)	36
3.1.5 Woodlands (296 acres)	38
3.1.6 Cliff and Rock Communities (0.58 acre)	39

3.1.7 Agricultural Communities (15 acres)	39
3.1.8 Disturbed or Developed Communities (299 acres)	39
3.1.9 Intact Native Habitat.....	40
3.2 VEGETATION DYNAMICS.....	40
3.2.1 Exotic Plant Species	42
3.2.2 Existing Fuels and Fire Hazard Conditions	44
3.3 GENERAL WILDLIFE	48
3.3.1 Raptors.....	48
3.3.2 Bats	50
3.4 WILDLIFE MOVEMENT CORRIDOR AND HABITAT FRAGMENTATION.....	51
3.5 THREATENED, RARE, OR ENDANGERED SPECIES	53
3.5.1 Sensitive Plant Species	53
3.5.2 Sensitive Wildlife Species	57
3.5.3 Sensitive Habitats	58
4.0 CULTURAL RESOURCES.....	60
4.1 ETHNOGRAPHIC	60
4.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES	62
4.2.1 Criteria for Evaluation	64
4.2.2 Evaluation of Cultural Resources within the Preserve	65
4.3 PALEONTOLOGY	66
5.0 MANAGEMENT GOALS AND OBJECTIVES.....	67
5.1 BIOLOGICAL CONSTRAINTS AND MANAGEMENT ZONES	67
5.1.1 Preservation Zone	70
5.1.2 Core Habitat Zone	72
5.2 THREATS AND POTENTIAL IMPACTS.....	72
5.2.1 Habitat Fragmentation	74
5.2.2 Invasive Plant Species	74
5.2.3 Urban Edge Effect	75
5.2.4 Public Use.....	75
5.2.5 Erosion.....	75
5.2.6 Existing Fuels and Fire Hazard Conditions	76
5.3 MANAGEMENT GOALS AND OBJECTIVES	76
5.3.1 Biological Resources Element.....	77
5.3.2 Cultural Resources Element	81
5.3.3 Public Use Element	83
5.3.4 Interpretation	85
5.3.5 Visual Resources and Aesthetics Element.....	86
5.3.6 Facility Maintenance Element	87
6.0 MANAGEMENT AND MONITORING IMPLEMENTATION	89
6.1 CURRENT AND PROPOSED MANAGEMENT ACTIVITIES	89
6.1.1 Current Management Activities.....	89
6.1.2 Proposed Management Activities	90
6.2 BIOLOGICAL RESOURCES MANAGEMENT	91
6.2.1 Acquisition Criteria	91
6.2.2 Fire Management and Fuel Modification	93
6.2.3 Biological Monitoring	95
6.2.4 Biological Resource Data Keeping.....	103

6.2.5	Habitat Enhancement and Restoration.....	104
6.2.6	Exotic Plant Control	105
6.2.7	Seed Collection and Storage.....	106
6.2.8	Exotic Animal Control.....	107
6.2.9	Wildlife Corridor Maintenance.....	107
6.3	CULTURAL RESOURCES MANAGEMENT	108
6.3.1	Cultural Resources Management Actions	108
6.3.2	Paleontological Resources Management Actions.....	109
6.4	PUBLIC USE.....	110
6.4.1	Access and Trails.....	110
6.4.2	Interpretive Themes.....	113
6.4.3	Interpretive Goals and Implementation Actions.....	114
6.4.4	Public Information.....	115
6.5	VIEWSHED AND AESTHETIC PROTECTION.....	115
6.6	PRESERVE MAINTENANCE	116
6.6.1	Erosion Control	116
6.6.2	Road and Trail Maintenance.....	117
6.6.3	Fencing and Boundary Control.....	121
6.6.4	Facility Maintenance	121
6.7	FUTURE MANAGEMENT	122
7.0	REFERENCES	123

APPENDICES

A	PRESERVE USER SURVEY
B	SOIL TAXONOMY AND ANALYSIS
C	TRAIL CONDITION ASSESSMENT
D	PLANT COMMUNITIES
E	VASCULAR PLANT SPECIES OBSERVED
F	ANIMAL SPECIES LIST
G	EXOTIC PLANT SPECIES DISTRIBUTION
H	RAPTOR SPECIES AT THE PRESERVE
I	SENSITIVE SPECIES TABLE
J	ARCHAEOLOGICAL RESOURCES
K	PALEONTOLOGICAL RESOURCES
L	PUENTE HILLS LANDFILL NATIVE HABITAT PRESERVATION AUTHORITY ACQUISITION CRITERIA
M	FUEL MODIFICATION PLAN
N	HABITAT RESTORATION FRAMEWORK PLAN
O	TRAIL DESIGN GUIDELINES
P	SIGNIFICANT REFERENCES AND STUDIES USED TO PREPARE THE RESOURCE MANAGEMENT PLAN

FIGURES AND TABLES

FIGURES

Figure 1: Preserve Location.....	2
Figure 2: Preserve Overview	3
Figure 3: Fire Events Greater than 2 Acres in the Vicinity of the Preserve, 1928 through 2005.....	23
Figure 4: Vegetation Communities	30
Figure 5: Intact Native Habitat	41
Figure 6: Distribution of Dominant Exotic Species	45
Figure 7: Acreage of Dominant Exotic Species Across Soil Association	46
Figure 8: Existing Fuel Modification Areas	47
Figure 9: Puente-Chino Hills Wildlife Corridor.....	52
Figure 10A: Biological Constraints.....	68
Figure 10B: Biological Constraints	69
Figure 11: Core Habitat and Preservation Management Zones.....	71
Figure 12: Trail Plan.....	112

TABLES

Table A: Recorded Fires in the Vicinity of the Preserve, 1928–2005 (2 acres or Larger)	21
Table B: Existing Vegetation Communities within the Preserve	31
Table C: Highly Invasive Species Identified in the Puente Hills	43
Table D: Expected Seasonal Status of Raptor Species at the Puente Hills Landfill Preserve	49
Table E: Rare Plants in the Preserve	54
Table F: Recommendations for California Register Eligibility.....	65
Table G: Analysis of Main Threats and Potential Impacts for the Preserve	72
Table H: Proposed Monitoring Schedule for Preserve Species of Interest	98

1.0 INTRODUCTION

1.1 OVERVIEW

The Puente Hills Landfill Native Habitat Preservation Authority (Habitat Authority) was established in 1994 as a joint powers authority with a Board of Directors representing the City of Whittier, the County of Los Angeles, the Sanitation Districts of Los Angeles County, and the Hacienda Heights Improvement Association. The agency was formed as a condition of approval for the operation of the Puente Hills Landfill. The purpose of the Habitat Authority is to acquire, restore, and maintain open space in the Puente Hills as permanent protection for the native habitat with special consideration given to the community of Hacienda Heights.

The Habitat Authority's lands (Preserve) consist of undeveloped land located within the Cities of Whittier and La Habra Heights and the unincorporated areas of Hacienda Heights and Rowland Heights, stretching from Harbor Boulevard in the east to the intersection of Interstate 605 and State Route 60 in the west (Figures 1 and 2). The Preserve currently consists of 3,860 acres, supporting coastal sage scrub, chaparral, native and nonnative grassland, oak woodland, walnut woodland, and riparian woodland. The Habitat Authority currently owns 1,865 acres, and the remainder of the land is owned by the City of Whittier or the Sanitation Districts of Los Angeles County.

Solid waste disposal fees from the Puente Hills Landfill provide the primary funding for the Habitat Authority. For every ton of trash deposited into the landfill, one dollar of the tipping fee is dedicated to the Habitat Authority, totaling approximately \$3.5 million per year. This funding will continue through the remaining life of the landfill, currently scheduled to close in November 2013. After this date, a future management endowment established by the Board of Directors will preserve and manage the open space lands in perpetuity.

The primary focus of the Habitat Authority is to acquire and preserve the remaining natural areas within its jurisdiction, with special consideration given to the Hacienda Heights area. The Habitat Authority also engages in many other important activities such as Preserve management and natural resource management and provides valuable services such as public outreach, as well as hiking, biking, and equestrian trails.

1.2 VISION AND MISSION

Vision and mission statements guide present day and future Habitat Authority activities including day-to-day operations, annual work plans, the Docent Manual, and this Resource Management Plan (RMP). The Vision also describes both the agency and the Preserve looking toward the future, when the Habitat Authority has achieved its overall plan objectives and satisfied public expectations. The Vision presents a guiding image of what the Preserve will ultimately provide for the region. The Mission statement also addresses the big picture but is more specific and "action-oriented," describing what the agency will do to fulfill the Vision.

On August 25, 2005, the Board of Directors of the Puente Hills Landfill Native Habitat Preservation Authority adopted the following Vision and Mission Statements.

1.2.1 Vision

The Puente Hills region has unique, irreplaceable natural resources with vibrant and diverse wildlife. The Puente Hills Landfill Native Habitat Preservation Authority is a public agency created to protect and preserve the native habitat in the Puente Hills for the benefit of our natural resources.

1.2.2 Mission

The Puente Hills Landfill Native Habitat Preservation Authority is dedicated to the acquisition, restoration, and management of open space in the Puente Hills for preservation of the land in perpetuity, with the primary purpose to protect the biological diversity. Additionally, the agency will endeavor to provide opportunities for outdoor education and low-impact recreation.

1.3 PURPOSE OF THIS RMP

This RMP provides a comprehensive, long-term management plan for the Preserve. The RMP will serve as a clear and realistic blueprint for how the Preserve will be managed for the next several decades and will guide the Habitat Authority on future policy, land use, budget, and capital improvement decisions relating to the Preserve. The RMP is designed to be flexible enough to allow changes and refinements to the approach for Preserve management as more is learned about ecosystems and the responses of these ecosystems to environmental stressors, including human use.

The fundamental objective for this RMP is to identify the best framework to manage, protect, and enhance the natural resource values of the Preserve while providing safe recreational and educational opportunities to the public. The RMP considers the natural and cultural resources present in the Preserve. The major plan objectives are to enhance wildlife habitats, develop vegetation management practices, and provide safe, low-impact recreational opportunities and public access.

The RMP incorporates an Ecosystem Management/Adaptive Management strategy. Ecosystem management integrates scientific knowledge of ecological relationships with the goal of protecting the integrity of native ecosystems over the long term. The RMP process included a review of the relationship between resources, including biological, cultural, and geological. The resulting management approach addresses the importance of each resource as well as potential conflicts between recreational activities and adjacent land uses.

Adaptive management is an approach to natural resource management that acknowledges uncertainty about how ecological systems function and how they respond to management actions. Under this model, management moves forward in a scientifically based way that involves monitoring, conducting targeted studies, and applying management activities as experimental treatments. The results feed back into decision-making, thus reducing uncertainty and improving the effectiveness of the program through time. Adaptive management implies an ongoing scientific commitment to the plan in perpetuity. Under adaptive management, managers use the best available information to make

decisions while questioning and seeking opportunities to learn how best to accomplish the goals of the plan.

All available literature and site-specific survey data was reviewed to develop a resource baseline and subsequent prescriptions. When necessary, the Habitat Authority conducted new surveys to address known data gaps. This baseline data set includes soils, habitat and wildlife inventories, sensitive species, cultural resources, fire history, and existing public use areas and trails. The main elements of the RMP are summarized below.

Section 1.0 provides an overview of the Habitat Authority and of the Preserve, including its regional significance and the Preserve's physical and use characteristics.

Section 2.0 provides a general description of the Preserve, including geographical setting, land use, geology and topography, soils, hydrology, climate, fire history, recreation, interpretation and education, and existing facilities.

Section 3.0 contains the results of research, site assessment, and survey work related to natural resources. Section 3.0 discusses vegetation communities, vegetation dynamics, wildlife habitats, wildlife movement corridor/habitat fragmentation, and sensitive species.

Section 4.0 contains the results of research, site assessment, and survey work related to cultural resources. Section 4.0 discusses site ethnography, existing structures, and paleontology.

Section 5.0 provides overall management goals and objectives for the Preserve. This section synthesizes the data, survey, and workshop results from Sections 2.0 through 4.0 into a coherent set of goals and objectives as a basis for implementation actions.

Section 6.0 provides the specific management actions required to implement the goals and objectives outlined in Section 5.0. Section 6.0 also addresses data management, monitoring strategies, and future funding. This section recommends a series of actions or plans that will be pursued in the future as money and staffing allow.

Section 7.0 provides literature references and other sources of information used to prepare this plan.

The **Appendices** contain study results, technical support documents that are referenced in the text, and other items too lengthy or detailed to be contained in the body of the RMP. The Appendices are provided under separate cover.

1.4 PRESERVE OVERVIEW

1.4.1 Location

The Preserve is located at the eastern edge of Los Angeles County, bounded by the San Gabriel River on the west and the Chino Hills to the east. With 3,860 acres, the Preserve extends across the boundaries of three municipalities: the Cities of La Habra Heights and Whittier and the communities of Rowland Heights and Hacienda Heights, both located in unincorporated Los Angeles County. Other public agencies with jurisdictional interests in the western Puente Hills include the San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy and the Wildlife Corridor Conservation Authority.

Access to the Preserve is available through a network of regional and local roadways and bicycle and pedestrian facilities. Regional access to the Preserve is provided via two major freeways: Interstate 605 (I-605), running northeast and southwest, which follows the San Gabriel River and connects with Interstate 5 (I-5); and State Route 60 (SR-60), running east and west, which connects to State Route 57 (SR-57). Local access to the Preserve is provided from Colima Road, Workman Mill Road, Harbor Boulevard, Turnbull Canyon Road, Skyline Drive, East Road, Fullerton Road, and Hacienda Boulevard. Several of these roadways provide preferential bicycle lanes. A dedicated public segment of the key regional Schabarum Trail (Skyline Trail)/San Juan Bautista de Anza National Historic Trail follows the Preserve's backbone ridge, providing pedestrian, equestrian, and bicycle access. Numerous abandoned oil field roads and unpaved trails are used informally by the public to gain access to the Preserve.

1.4.2 History of Use

From the 16th through the 19th centuries, the Gabrielino Indians occupied most of the land that is now Los Angeles and Orange Counties. The name "Gabrielino" was given due to the affiliation of these Indian peoples with Mission San Gabriel Arcángel, founded in 1771 (Hoover et al. 1962 and McCawley 1996). Today, some of the Gabrielino prefer to call themselves *Tong-va*, meaning "people of the earth" (McCawley 1996).

The Gabrielino Indians practiced a hunter-gatherer lifestyle, and community populations generally ranged from 50 to 150 inhabitants (Bean and Smith 1978). Three distinctive settlement and subsistence patterns are identified for the Gabrielino communities:

- The first pattern occurred in the interior mountains with primary settlements located in the lower reaches of canyons, thus offering protection against the cold winter weather. During spring and summer, individual families traveled to seasonal camps to gather bulbs, seeds, and plant foods. In the fall, they moved to oak groves to gather acorns.
- A second pattern prevailed on the inland prairies, where each winter, populations migrated to coastal shellfish-gathering camps.
- The third settlement and subsistence pattern occurred among coastal settlements during the winter season when the seas were too rough for fishing. Coastal inhabitants departed to inland habitations to hunt animals and gather acorns and other plant foods (Hudson 1971). Refer to Section 4.1 for additional information on the Gabrielino.

Much of the land within the Preserve was historically part of the Rancho La Puente, granted to William Workman and John Rowland in 1845. The two men, with a group of 25 emigrants, led a wagon train west from Taos, New Mexico, reaching Los Angeles by way of the Gila and Colorado Rivers in November 1841. In 1845, they received a 48,790-acre formal grant of land in California that had formerly belonged to the San Gabriel Mission. The ranch extended from the hills of what is now Hacienda Heights to San Bernardino Road in Covina and from the San Gabriel River to Walnut and Pomona, encompassing what is now Baldwin Park, Charter Oak, Covina, La Puente, West Covina, and much of the Puente and San Jose Hills.

In the beginning, the partners owned the land jointly, residing in adobe dwellings less than 1 mile apart on the banks of San Jose Creek and running their herds of cattle on unfenced land. By 1850, the rancho was almost totally self-sufficient. In 1851, they formally divided the land, with Workman taking the western 20,000 acres and Rowland the eastern 29,000 acres and continued to work the land together, raising cattle and sheep, growing wheat, selling wool, and cultivating grapes and fruits for brandies and wines. They worked the land with grist mills, cattle ranching, and brandy production until the 1870s. When Rowland died in 1873, his land passed to his heirs and was kept as undeveloped land as late as the second half of the 20th century. Other areas of what is now the Preserve were ranched by Pio Pico, Andreas Pico, and Mariano Roldan, and some were left as public ranching lands, such as Turnbull Canyon, to minimize boundary conflicts.

The land passed from Rowland and Workman in the 1870s, and their agricultural legacy continued for decades. In the early 20th century, cattle and sheep ranching gave way to avocado and walnut groves and citrus orchards. North Whittier Heights (now Hacienda Heights) and La Puente became known for their fruit and walnut production. But the post-World War II building boom, combined with insects and disease, instigated the demise of agriculture in the area.

The Southern Pacific and Santa Fe Railroads built lines through the region in the early 20th century (Cramer 1969), which opened it up for development and attracted settlers. Most of the land located on the original *rancho* was sold and developed, forming the communities of Hacienda Heights, City of Industry, and La Puente. Much of the area continued to be used for agriculture and cattle and sheep grazing until the 20th century development of the petroleum industry.

Oil exploration began in the Central Valley of California in the 1870s, and as exploration continued, the oil industry expanded into Southern California. As a result of initial productive exploration, large swaths of the area in and around the Puente Hills were developed as oil fields and oil wells, with many continuing to operate today. Whittier became a center of oil production in the Los Angeles Basin during the first half of the 20th century (Whittier News 1917), with Standard Oil choosing the location for its Southern California headquarters. The oil industry brought significant economic development to the region, beginning with the first important discovery in the Puente Hills in 1885, culminating with the boom of the 1920s, and continuing with the increased oil demands of World War I and World War II.

In the 1930s Gus Gregg established the Cal-Baden Mineral Springs Resort in Sycamore Canyon, a sulphur spring long known to local residents. The Gregg family patriarch started the Sycamore Canyon Gravel Company in 1917 (The Whittier News Annual Edition 1923). The entrance to the canyon was landscaped with lush vegetation, and a swimming pool, baths, sunroom, patio, and riding stable were added to accommodate the resort guests. Eventually, the water was carbonated and

bottled for sale to the public (Pearce et al. 1977). The resort burned in 1963 (Pearce et al. 1977) and was not rebuilt. Remnants of the baths are still visible, and the spring exists to this day.

Several major travel routes cross the Puente Hills, including Turnbull Canyon Road, constructed in 1915, but there are still vast stretches with no access other than trails. In the early 20th century, the La Puente Valley was the site of considerable industrial development, especially in the aforementioned oil industry, as well as in the banking and commercial industries. This trend has continued to the present, with increased suburbanization and commercial and industrial development (County of Los Angeles Public Library 2001).

During the Cold War era throughout most of the 1950s and much of the 1960s, the United States Army operated a surface-to-air missile defense system along the continental Pacific Coast, code-named Nike after the Greek Goddess of Victory. The Nike-Ajax was the first supersonic anti-aircraft missile system to become operational in the United States, and these missile defense sites surrounded key population and industrial centers such as Los Angeles. The Army began operating its first Nike-Ajax missile launch site in the Los Angeles area in 1954 (Fort MacArthur Museum Association 2006).

By 1958, 16 Nike-Ajax launch sites encircled the greater Los Angeles area. Each launch site contained Integrated Fire Control (IFC) "command guidance" radar systems to detect incoming targets and direct the intercept missiles, several launching platforms each with underground storage magazines, and administrative areas. The Los Angeles defense area was manned by several battalions of United States Army Regulars and National Guardsman under the command of the 47th Air Defense Brigade from 1954 to 1969. The remnants of the Nike LA-14 IFC site is located in the Puente Hills outside of Preserve-managed land and above the present Rio Hondo Police Academy. This Nike site was in operation between 1956 and 1959 and the IFC is currently being used as a radar relay station (Fort MacArthur Museum Association 2006).

1.4.3 Acquisition History

As of March 2007, the Habitat Authority actively manages 3,860 acres of preserved open space. A total of 1,878 of those acres are owned directly by the Habitat Authority, while the other 1,982 acres are owned by other member agencies on its Board of Directors. The Habitat Authority's first acquisition was of 517 acres in Powder Canyon, La Habra Heights, in May 1996. Its second acquisition occurred later that year and included 63 acres in Hacienda Heights. There have been 27 land transactions ranging from less than 1 acre in size to over 950 acres, resulting in the Habitat Authority's ownership of 1,878 acres in Hacienda Heights, La Habra Heights, and Whittier. Acquisitions by the Habitat Authority have cost over \$33 million. The Sanitation Districts transferred management responsibilities of their 225 acres of open space to the Habitat Authority in May 1996. The City of Whittier owns approximately 1,756 acres and acquired the majority of these properties from January 1994 through March 1998. Management for City-owned properties by the Habitat Authority began in November 1997. Overall, approximately \$50 million to date has been invested to acquire all of the above-mentioned properties.

1.4.4 Global and Regional Significance

The Preserve is an integral part of the Puente-Chino Hills Wildlife Corridor, an unbroken zone of natural habitat extending nearly 31 miles from the Cleveland National Forest in Orange County to the west end of the Puente Hills above Whittier Narrows. Covering more than 30,000 acres of land, the Puente-Chino Hills support a wide variety of habitats. The distribution of vegetation types and subtypes within the Puente-Chino Hills is influenced by a variety of abiotic factors, including soils, slope steepness and aspect, elevation, and microclimate. These, in turn, are influenced significantly by the combination of the geology of the region and local climatic influences. The Puente-Chino Hills are in a region that represents a transition between two coastal sage scrub habitat types, Venturan and Riversidean, as classified statewide by Holland (1986). When combined with other habitat types in the area, such as chaparral and oak/sycamore woodland, the vegetation provides habitat for a unique assemblage of plants and animals. Biologically, this area preserves a microcosm of the California Floristic Province, an identified biodiversity hot spot in North America and a genetic reserve for the continent. As a result, the Preserve is regionally and globally significant as a prime example of this unique habitat web, yet it occurs in an area that is almost completely surrounded by existing development, with the attendant human influences. Remaining corridors of undeveloped land within the Puente-Chino Hills provide a rare opportunity to preserve a functional ecosystem. This wildlife corridor provides food, cover, breeding grounds, refugia in the event of a large disturbance, contributes to species diversity, dispersal routes for juveniles, home ranges, and the transfer of genetic material, which help maintain healthy populations. Corridors are important in sustaining populations of both animals and plants. The Preserve consists of the western portion of the Puente Hills, comprising large areas of important habitat and wildlife resources.

Despite its long history of use and proximity to urban development, the Puente Hills support many of the typical and unique landscapes of California—coastal sage scrub, chaparral, native grassland, walnut woodland, and oak woodland—and sustains important habitat for a number of native animal species, including the coastal California gnatcatcher (*Poliioptila californica*), cactus wren (*Campylorhynchus brunneicapillus*), mule deer (*Odocoileus hemionus*), and mountain lion (*Puma concolor*). The first two species are target species of regional habitat planning efforts in Southern California. The plant communities found in the Preserve are becoming increasingly rare on a global scale, as are many of the wildlife and rare plant species that require walnut woodland, oak woodland, chaparral, native grassland, and coastal sage scrub habitats.

Located in a metropolitan region of nearly 20 million people, increasingly surrounded by urban development and close to downtown Los Angeles, the Preserve provides visitors a unique opportunity to experience natural resources in a setting not commonly found in the highly urbanized Los Angeles region. The Preserve provides a range of recreation opportunities and activities, including hiking, jogging, mountain biking, horseback riding, nature appreciation, and outdoor education. The challenge for the Habitat Authority is to balance natural resource protection and low-impact recreation.

The Preserve will continue to provide exceptional opportunities for visitors to enjoy natural serenity, open space, scenery, and other key components that enhance the quality of life.

1.4.5 Physical Characteristics of the Preserve

The long history of human use of the Puente Hills has left a legacy of manmade features. Major arterial roads such as Colima and Turnbull Canyon Roads wind through the hills, with numerous smaller roads and trails providing recreation access and service access to transmission lines and for fire protection. Electrical transmission and telephone lines traverse the ridgeline. Oil field remnants, including abandoned oil wells and pavement from old oil roads, highlight the prominence of the Puente Hills in the oil production of Los Angeles at the beginning of the 20th century.

The landscape of the Preserve consists of topography characterized by steep hillsides surrounding deep canyons. Major canyons include Sycamore Canyon, Turnbull Canyon, Worsham Canyon, and Powder Canyon. The more gently rolling areas surround Colima Road near Arroyo Pescadero. Most hilltops range from 700 feet (ft) (210 meters [m]) above mean sea level (amsl) to just over 1,300 ft (400 m) amsl and decrease into the low-lying area drainages varying from 400 ft (120 m) amsl to 600 ft (180 m) amsl.

Sycamore Canyon. Sycamore Canyon is located off of Workman Mill Road in the westernmost portion of the Preserve. This linear canyon has a watershed with an east-to-west-draining perennial stream with a moderate to gentle slope. Sycamore Canyon originates outside the Preserve in a bowl-shaped watershed near Rose Hills Memorial Park, which has a nearby peak elevation of approximately 1,100 ft (330 m) amsl. Elevation within the Sycamore Canyon portion of the Preserve is approximately 900 ft (270 m) amsl along the ridgelines, while the perennial stream averages approximately 450 ft (140 m) amsl. This canyon is one of the most natural and undisturbed areas within the Preserve. Plant communities include annual grassland, sagebrush scrub, toyon-sumac chaparral, and sycamore riparian woodland.

Puma, Toyon, and Coyote Canyons. Puma, Toyon, and Coyote Canyons are located in Hacienda Heights east of Sycamore Canyon in the northwest portion of the Preserve and feature three major parallel drainages. These canyons are some of the steepest and most densely vegetated within the Preserve. Elevations along the three ridgelines are approximately 1,000 ft (300 m) amsl and descend sharply to approximately 600 ft (180 m) amsl at the lowest area along the northeast edge of the Preserve. Due to the mesic and shaded conditions on some of the slopes, coast live oak woodland, oak riparian woodland/sycamore riparian woodland, and dense associations of annual grassland and toyon-sumac chaparral grow here.

Turnbull Canyon. Turnbull Canyon is located southeast of Sycamore Canyon in the north-central portion of the Preserve. Within the Preserve, Turnbull Canyon is approximately 1 mile long and drains from east to west. Turnbull Canyon Road is a winding road that was created along the southern slope of this canyon and connects Beverly Boulevard in the City of Whittier with the unincorporated community of Hacienda Heights. This canyon has many steep-sided drainages that feed the canyon's stream with a narrow stretch of mature sycamore riparian woodland. This stream drains from approximately 800 ft (240 m) amsl to 650 ft (200 m) amsl at the east edge of the City of Whittier. Elevation along the ridgelines is approximately 1,300 ft (400 m) amsl and decreases sharply to approximately 650 ft (200 m) amsl near the canyon bottom. Due to the combination of slope aspects, vegetation communities in this watershed are a combination of toyon-sumac chaparral with a high

concentration of poison oak on the mesic north-facing slopes and dense associations of annual grassland, purple sage scrub, and sagebrush scrub on the drier south-facing slopes.

Worsham Canyon and Arroyo Pescadero. Several drainages within the central portion of the Preserve include the less steep, rolling hills of the Preserve. This area extends south from Turnbull Canyon to the southern portion of the Preserve approximately 4,500 ft (1,370 m) east of Colima Road. Six watersheds in this area have east-to-west drainages with moderately gentle to steep slopes: Worsham Creek, Savage Creek, Bacon Creek, La Cañada Verde Creek, Arroyo Pescadero, and Arroyo San Miguel (listed north to south, respectively). Topography in this area is more irregularly shaped and less defined than the more linear canyons to the north. Elevations within this central area range from a high of approximately 1,300 ft (400 m) amsl along the northeast ridgeline shared with Turnbull Canyon and a low of approximately 400 ft (120 m) amsl near the southwest edge. Vegetation in this area has been heavily disturbed by former oil production and grazing. Plant communities include annual grassland, purple sage scrub, black sage scrub, toyon-sumac chaparral, mulefat scrub, non native eucalyptus woodland/forest, and non native ornamental plantings.

Powder Canyon. Powder Canyon is accessed from Harbor Boulevard, which passes near the eastern edge of the Preserve. The Powder Canyon area is a moderately narrow portion of the Preserve that is separate from the primary Preserve area. This area has a west-to-east ridgeline characterized by steep slopes in the western half of the area and more gently rolling hills in the east. Elevation along the ridgelines ranges from approximately 900 ft (270 m) amsl to 1,300 ft (400 m) amsl to 700 ft (210 m) amsl at the lowest creek near Harbor Boulevard. Annual grassland, purple sage scrub, toyon-sumac chaparral, Mexican elderberry woodland, and coast live oak woodland are characteristic of the slopes and ridgeline vegetation. The south-facing slopes drain into La Mirada Creek, which passes through the Hacienda Golf Club and into the City of La Habra in Orange County. Additional small land holdings are to the east of Arroyo San Miguel and southeast of Powder Canyon. The land holdings to the west straddle Hacienda Boulevard and are on moderately steep slopes, while the small parcels to the southeast are on a ridge top near Harbor Boulevard.

1.4.6 Use Characteristics of the Preserve

The location of the Preserve within a growing metropolitan area with good highway access and opportunities for use year-round have made it an extremely popular and heavily used recreation destination for local residents and regional visitors alike. Visitor use in the Preserve varies by location. The rugged terrain in Turnbull Canyon is favored heavily by mountain bikers, while the steep canyons in the Hacienda Hills provide intimate, tranquil trail settings for hikers and joggers. Arroyo Pescadero offers a relatively-level, 2-mile loop trail that is perfect for families, while Powder Canyon with a warm-up equestrian ring and equestrian staging area provides a jumping-off point for horseback riders to explore the many miles of trails throughout the Preserve.

In October 2005, the Center for Sustainable Cities from the University of Southern California counted trail users and conducted a survey at five entrances: Hacienda Hills Trailhead, Arroyo Pescadero, Turnbull Canyon, Powder Canyon, and Hellman Park. The primary objectives of the survey were to:

- Assess the demographics of trail users;

- Document attitudes toward the outdoors, trail use, and management;
- Count the number of trail users; and
- Evaluate the interaction between users.

The survey was conducted over 4 days, with 916 trail users counted at the five trailheads, resulting in 371 completed surveys. One of the conclusions of the survey was that there is strong support for conservation, even if this action results in restricting some of the trail uses. The detailed results of this survey are included in Appendix A.

2.0 PRESERVE DESCRIPTION

2.1 GEOGRAPHICAL SETTING

The Preserve is located amid a patchwork of relatively undeveloped areas between the Los Angeles Basin on the west and the rapidly developing “Inland Empire” (i.e., southwestern San Bernardino and northwestern Riverside Counties) to the east. The connection to the undeveloped Santa Ana Mountains to the south is relatively intact between the Preserve and remaining undeveloped land to the east that connect with Chino Hills State Park and the Coal Canyon undercrossing of Highway 91 at the north end of the mountains. To the north, ties to the undeveloped San Gabriel Mountains are more tenuous. The Montebello Hills and Whittier Narrows recreation area and flood control basin, across the narrow Interstate 605 corridor from the west end of the Preserve, are connected to the mountains via the narrow San Gabriel River and Rio Hondo channels. To the east, the isolated San Jose Hills and Frank Bonelli Regional Park are approximately midway between the Puente Hills and the foothills of the San Gabriel Mountains.

2.2 ADJACENT LAND USES

The Preserve is almost completely surrounded by urban development except for undeveloped lands east of the Preserve and west of Chino Hills State Park and Whittier Narrows to the northwest. Development consists primarily of suburban, single-family residential development associated with the surrounding communities of Whittier, La Habra Heights, Hacienda Heights, and Rowland Heights. Industrial development in the City of Industry lies to the north of State Route 60. Whittier College is located to the south near Worsham Canyon.

Rose Hills Memorial Park owns a large area in the northwestern Puente Hills between the City of Whittier and Hacienda Heights. Some of this land has been developed as a cemetery, while other portions are undeveloped. The Puente Hills Landfill is located northeast of the Rose Hills Memorial Park and adjacent to the Preserve. Savage Landfill, owned by the City of Whittier, is located adjacent to the middle southern portion of the Preserve. Two golf courses, Friendly Hills Country Club in Whittier and Hacienda Golf Club in La Habra Heights, are adjacent to the Preserve as well.

Chino Hills State Park is located southeast of Aera Energy, LLC, and the Preserve. Aera Energy, LLC, a private landowner, is east of the Preserve and currently extracts oil from its land and allows surface use for cattle grazing. Other major recreation facilities located near the Preserve include Schabarum Regional Park and Pathfinder Park. Schabarum Regional Park, owned and managed by the County of Los Angeles, is just north of Powder Canyon in the eastern part of the Preserve and contains an equestrian center, restrooms, ample parking, picnic tables, and a network of trails. Pathfinder Park, also owned and managed by the County of Los Angeles, lies east of Powder Canyon and contains multiple lighted tennis courts and baseball diamonds, a lighted basketball court, conference facilities, a large picnic area with barbecues, and a 1.5-mile walking trail.

2.3 PHYSICAL RESOURCES

2.3.1 Geology and Topography

The Puente Hills make up the western part of the more extensive Puente-Chino Hills, located at the northern end of the Peninsular Ranges Geomorphic Province. The San Gabriel Valley is to the northwest, with the San Bernardino Valley to the northeast, and the Los Angeles Basin to the south. The Puente Hills extend from 400 to 1,416 ft above sea level. In comparison, other mountain ranges in the region, including the San Gabriel, Santa Ana, San Bernardino, and San Jacinto Mountains, range from 5,000 to 8,000 ft above sea level. The terrain in the Preserve consists of ridgelines and gentle to very steep slopes covered in dense vegetation.

Geologically, the Preserve lies in what is defined as the Puente Formation on the extreme southeastern edge of the Los Angeles Basin, in the Puente Hills south of the San Gabriel Mountains. The Puente Formation was formed as part of a long and continuous process. During the Cretaceous Period (144 to 65 million years ago), the North American plate and other oceanic plates of the Pacific slowly converged to form the Sierra Nevada and Peninsular Ranges (Hamilton 1986). The Puente Hills are located at the northern end of the Baja California Peninsular Range. Uplifting of the Puente Hills occurred along the Whittier-Elsinore Fault and the Puente Hills Blind Thrust Fault. This fault is considered blind because it is buried deep beneath alluvium and does not rupture all the way up to the ground surface (Field et al. 2005). The late Miocene, marine, Puente Formation is divided into four members: the La Vida Member (Tplv), predominantly siltstones; the Soquel Member (Tps), predominantly sandstones; the Yorba Member (Tpy), predominantly siltstones; and the Sycamore Canyon Member (Tpsc), predominantly sandstones.

La Vida Member (Tplv). The La Vida Member is an early-to-late Miocene (lower Mohnian), marine, light brown to pinkish brown and light gray to almost white siliceous and micaceous shale and siltstone. It contains interbeds of yellowish to light gray feldspathic sandstone. Sandstone grains are quartzo-feldspathic, micaceous, and angular to subangular. Siltstones are diatomaceous and micaceous and contain montmorillonite as the main clay mineral. Sandstone is thin to thickly bedded and locally graded or cross-bedded. Siltstone and shale are thin-bedded to laminate.

Soquel Member (Tps). The Soquel member of the Puente Formation is derived from a deep marine (bathyal) environment. It contains medium- to coarse-grained, gritty sandstone and is interbedded with siltstone. The upper part is a light gray to light yellowish brown, medium to coarse sandstone with pebbles. The siltstone units can be locally siliceous and may contain chert beds. The lower part of the unit is light gray to light yellowish brown, thick-bedded to massive sandstone. The unit also contains zones of large concretions. Fossils are generally uncommon; however, fossils of red and brown algae, terrestrial vascular plants, invertebrates, and fish have been found in abundance in some areas (Sundberg 1991).

Yorba Member (Tpy). The Yorba Member is a late Miocene (upper Mohnian), marine, pinkish-brown to gray and white shale and siltstone to sandy siltstone with interbeds of thinly bedded sandstone. Locally, there are interbeds of limestone, conglomerate, and thick beds of sandstone. The sandstones contain subangular to subrounded grains that are chiefly quartzo-feldspathic. The siltstone

commonly contains mica and can be siliceous or diatomaceous. The major clay mineral is montmorillonite. Gypsum is common in joints. Sandstone interbeds are thin to thickly bedded and locally massive. The siltstone is thinly bedded and platy (tends to break into thin plates) to thinly laminated; local bedding in the siltstone is poorly developed.

Sycamore Canyon Member (Tpsc). The Sycamore Canyon Member is a late Miocene marine unit with interbeds of light yellowish brown and light gray sandstone and sandy siltstone with minor conglomerate near Burruel Ridge in Orange County. The conglomerate clasts are mostly well-rounded plutonics with occasional metamorphic and volcanic rocks. Sandstone grains are subangular and quartzo-feldspathic with abundant biotite (up to 40 percent in some areas). Sandstone is thickly bedded to massive. Siltstone is thinly bedded and often platy. An alternating silty sandstone and pebbly conglomerate, the Sycamore Canyon Member has a deep marine origin.

2.3.2 Soils

The Preserve contains several soil series that support different types of vegetation. To understand the relationship between soil type and plant communities, representative soils within the Preserve were analyzed to determine correlations between soil type and habitats, including weedy exotic plant communities. Analysis of the soils occurring in the Preserve began with a review of the Natural Resources Conservation Service's Soil Taxonomy (1999) and Report and General Soil Map, Los Angeles County (1969).

The General Soil Map designates associations of two or more soil series. A soil association is a group of defined and named taxonomic soil units occurring together in a characteristic pattern in a geographic area. Thirteen specific soil series occur in the Preserve within six soil associations: Altamont Diablo (341 acres); Altamont Diablo (1,175 acres); Hanford (618 acres); Mocho Sorrento (16 acres); Perkins-Rincon (374 acres); and San Andreas-San Benito (1,266 acres).

A summary of the six soil associations is provided below. The mapped soil associations are not in themselves soil classifications, but represent a coarse mapping effort identifying particular soil series that occur together in specific geographic areas. Dominant soil series for each mapped soil association in the Preserve belong to the same soil order. In some of the identified soil associations, between 10 and 20 percent of the soil within a specific soil association is made up of one or more soil series that belong to different soil orders. More detailed information regarding each soil series as well as the results of soil sampling are provided in Appendix B.

Altamont Diablo (9–30 percent slopes) and Altamont Diablo (30–50 percent slopes). Soils in this association are classified as mainly in the order Vertisols. Vertisols are mineral soils that have a high content of clay, in particular clays that are sticky and the swelling- and shrinking-type clays to a depth of 1 m or more in the soil. Deep, wide cracks form due to the periods of shrinking and swelling and are a key characteristic to defining the soil. Vertisols generally occur in climates that allow for a dry period of several months, such as in Southern California. Typical vegetation growing on Vertisols in the Preserve are annual and perennial grassland as well as shrub vegetation such as toyon-sumac chaparral, coyote bush scrub, and purple sage scrub. Soil series within this association include:

- **Altamont Series.** The Altamont series consists of deep, well-drained fine soils that formed materials weathered from fine-grained sandstone and shale. These soils are gently sloping to very steep uplands. The soils are silica clay materials that have a lattice structure that allows shrinking and swelling, or smectitic (smectite minerals swell when wet) characteristics, resulting in large cracks in the dry season. Water-holding capacity is low at 3–4.5 inches, typical of clays from a Mediterranean climate.
- **Diablo Series.** The Diablo series is similar to the related Altamont series and consists of deep, well-drained fine soils that have dark-gray, neutral, and mildly alkaline silty clay upper A-horizons. The lower A-horizons are gray and olive-gray, calcareous, silty clay. The silty clay AC- and C-horizons rest on shale. These soils are on gently sloping to very steep uplands. These soils also have shrinking and swelling characteristics, resulting in large cracks in the dry season. The water-holding capacity of this clay is also low, at 2.5–5.5 inches.

Hanford. Soils in this association are classified mainly as Entisols. Entisols are weakly developed mineral soils. In general, the Entisols within the Preserve are on gently sloping terraces. Typical vegetation is sagebrush scrub, mustard, and annual grassland. Soils in this association include:

- **Hanford Series.** Hanford soils are coarse-loamy, superactive soils that are very deep and well-drained. The soils form from alluvium and are found in floodplains and alluvial fans with slopes of 0–15 percent. The water-holding capacity of this soil is low at 5–7.5 inches.
- **Yolo Series.** Yolo soils are fine-silty, superactive soils that are derived from sedimentary formations on nearly level to moderately sloping alluvial fans. The water-holding capacity is moderate at 8–10.5 inches.
- **Hesperia Series.** Hesperia soils are coarse to loamy, superactive soils that are well-drained. The water-holding capacity is moderate at 6–9 inches.

Mocho-Sorrento. Soils in this association are classified mainly as Mollisols. Mollisols are mineral soils that are characterized by the accumulation of organic matter that is rich in calcium. The Mocho-Sorrento Association accounts for only 15 acres and supports mainly scrub, chaparral, and annual grasses. Soil series within this soil association include:

- **Mocho.** Soils of the Mocho series are well-drained loams and are found on alluvial fans and floodplains. Formation of the soils is from alluvium derived from sedimentary rocks. The soils occur on slopes ranging from 0 to 9 percent and are at elevations of 50–700 ft. Throughout the profile, the soil is moderately alkaline and calcareous. Permeability is moderate, and the effective rooting depth is 60 inches or greater. Water-holding capacity is moderate at 8.5–10 inches.
- **Sorrento.** Soils of the Sorrento series are well-drained loams and are found on alluvial fans and floodplains. Formation of the soils is from alluvium derived from sedimentary rocks. The soils are found on slopes ranging from 0 to 9 percent at elevations of 50–700 ft. In the upper 6 inches, the soil is neutral and becomes moderately alkaline and calcareous below. Permeability is moderate, and the effective rooting depth is 60 inches or more. The water-holding capacity is moderate at 8.5–10 inches.

Perkins-Rincon. Soils in this association are classified as Alfisols. Alfisols are the most strongly weathered of all the soil orders present in the Preserve. Approximately 374 acres of the Preserve are classified as Perkins-Rincon Association. The main vegetation is annual grasses as well as areas of scrub and toyon chaparral. Soil series within this association include:

- **Perkins Series.** Perkins soils are silty clay loam over 60 inches deep and well-drained with slow subsoil permeability. The Bt-horizon averages 25–35 percent clay, while the A-horizon is generally fine, sandy loam. The soils form in alluvium from sedimentary rocks. The soils are found on old alluvial terraces and old marine terraces with slopes of 0–30 percent. Water-holding capacity is moderate at 7.5–9 inches.
- **Rincon Series.** Rincon soils are silty clay loam over 60 inches deep and well-drained with slow subsoil permeability. Generally, there is a gradual or diffuse boundary between the A- and Bt-horizons. The soils are smectitic, with silica clays that have a lattice structure that allows soils to swell in the wet season and shrink in the dry season. The soils form in alluvium from mixed-rock sources. The soils are found on terraces with slopes of 0–30 percent. Water-holding capacity is high at 9–10.5 inches.

San Andreas-San Benito (30–70 percent slopes). Soils in this association are classified as mainly in the order Mollisols. The San Andreas-San Benito (30–70 percent slopes) association accounts for approximately one-third (1,266 acres) of the Preserve on moderate to steep slopes. Approximately 10 percent of the San Andreas-San Benito (30–70 percent slopes) association is classified as Inceptisols. Inceptisols are also primarily mineral soils. The main vegetation types found within this soil association are chaparral and scrub, annual grasses and mustard, and oak woodland. Soil series within this soil association include:

- **San Andreas.** San Andreas soils are 24–36 inches deep and are well-drained with moderately slow subsoil permeability. The soils have a fine sandy loam surface layer to approximately 15 inches, with a grayish-brown fine sandy loam subsoil approximately 13 inches thick underlain by sandstone. Available water-holding capacity is very low at 2.5–3.5 inches.
- **San Benito.** San Benito soils are 36–48 inches deep and are well-drained with a moderately slow subsoil permeability. They have dark grayish-brown, neutral clay loam surface layers to about 28 inches with moderately alkaline, calcareous clay loam subsoil. The subsoil is calcareous sandy shale. Water-holding capacity is moderate at 6.5–8.5 inches.
- **Balcom Series.** The Balcom series consists of well-drained soils that are found on uplands. The soil is silty clay loam weathered from soft, fine-grained sandstone, calcareous soft shale, and marl. Structure ranges from granular to weak subangular blocky, or the soil is massive. The soil is moderately alkaline and calcareous throughout the profile. Permeability is moderately slow. The soil is generally 26–40 inches deep, and available water-holding capacity is moderate at 5–7 inches for this depth.
- **Castaic Series.** Castaic soils are 26–40 inches deep, well-drained, with slowly permeable silty clay loams. The structure is strong fine granular with many very fine roots in the A-horizon to 10 inches. They occur on strong to very steep slopes and are formed from weathered shale, sandstone, and mudstone. Available water-holding capacity is moderate at 6.5–8.5 inches.

2.3.3 Hydrology and Water Quality

Hydrology. The Puente Hills are part of the San Gabriel River Watershed, which covers approximately 640 miles of land and is bounded by the San Gabriel Mountains to the north, most of San Bernardino/Orange County to the east, the division of the Los Angeles River from the San Gabriel River to the west, and the Pacific Ocean to the south. Major tributaries to the San Gabriel River include Walnut Creek, San Jose Creek, Coyote Creek, and numerous storm drains. The Coyote Creek Watershed drains approximately 150 square miles in southeastern Los Angeles County. Southern portions of the Preserve along Whittier and Powder Canyon are located within this watershed. Minor tributaries located within the Preserve include La Cañada Verde Creek, Arroyo Pescadero, Arroyo San Miguel, Tacobi Creek, Arroyo Jalisco, Arroyo Salinas, Leffingwell Creek, LaMirada Creek, and unnamed drainages in Powder Canyon.

The San Gabriel River is part of an extensive network of channels, dams, and spreading grounds used for flood control and water conservation. The Los Angeles County Department of Public Works (LADPW) and the United States Army Corps of Engineers (Corps) are the two primary agencies responsible for operating these facilities. The Preserve is located just east of the Whittier Narrows, a low point between the Puente Hills and Montebello Hills that form the southern boundary of the San Gabriel River Valley. The Whittier Narrows Dam is operated by the Corps to regulate flows from the San Gabriel River to the Rio Hondo for flood control and water conservation. Portions of the flow from the San Gabriel River are conveyed to the Rio Hondo by a manmade channel known as Lario Creek or Zone 1 Ditch. Flood flows from the San Gabriel River are stored temporarily behind the dam, and controlled releases are made to the Rio Hondo and/or the San Gabriel River. Flows in excess of the capacity of the San Gabriel River that cannot be stored behind the dam are discharged to the ocean (LADPW 2005).

The existence of fissures within the Puente Hills has allowed groundwater to rise to the surface, resulting in natural springs. Areas in Sycamore Canyon and Worsham Canyon still yield surface water today. Due to the local geology, other natural springs are likely to exist in the Preserve.

The presence of water in these streams and creek courses keeps soils moist and supports a vegetation makeup different from the surrounding drier upland areas. Riparian habitats include everything from riparian herb habitat to willow and mulefat scrub to sycamore riparian woodland and coast live oak riparian forest. Riparian trees and shrubs are tolerant of long periods of surface waters and/or saturated soil conditions along a stream corridor and also have the ability to tap into deeper zones of soil moisture during the dry season. Although this unique community accounts for less than 1 percent of California's total forest acreage, it supports one of the most diverse ecological communities of plants and animals.

Water Quality. The Los Angeles Regional Water Quality Control Board (RWQCB) has prepared the Basin Plan, a document designed to "preserve and enhance water quality and protect the beneficial uses of all regional waters" (California RWQCB, Los Angeles Region 1994). The Basin Plan designates beneficial uses, provides a list of impairments degrading the water quality, and offers programs to protect waters in the region.

Beneficial uses are defined as "uses of water identified in State and regional water quality control plans that must be achieved and maintained" (California RWQCB, Los Angeles Region 1994). These

uses include recreation, groundwater recharge, and wildlife habitat, among others. Impairments to water quality adversely affect beneficial uses and can be classified as nonpoint or point sources. Nonpoint sources are sources of pollution that have no direct origin, whereas point source pollution is a known source. Because the Preserve is largely in an undeveloped state, pollution sources that may be associated with the Preserve would generally be considered nonpoint sources.

The Basin Plan details impaired water bodies within the region. None of the drainages within the Preserve are specifically listed as impaired; however, runoff from the Preserve ultimately drains into two drainages that are listed: Coyote Creek and the lower reaches of the San Gabriel River. Some of the impairments listed in the Plan include coliform, toxicity, dissolved copper, zinc, and selenium, among others.

The Preserve is managed as open space and is not expected to contribute to downstream pollution levels. Drainage from the Preserve and other natural areas may contribute to sediment and coliform levels in the abovementioned drainages. Coliform levels are generally linked to fecal material, both human and wildlife.

Off-site sources of pollution may also impact the Preserve. The most significant is storm and nuisance runoff entering Sycamore Canyon, potentially from the Rose Hills Memorial Park. Both landscaping and ongoing agricultural uses may result in loading of nutrients, pesticides, and other unknown constituents into Sycamore Canyon.

Current and future management measures will be designed in consideration of water quality and beneficial uses. The Habitat Authority currently requires that park patrons pick up after their dogs, but does not require cleanup for horse manure. Rangers enforce Preserve trail rules to minimize the creation of unauthorized trails in inappropriate areas, and erosion problems are quickly repaired to minimize sediments entering the drainages.

The Habitat Authority does its best to minimize impacts to water quality associated with new projects. Recently a large bioswale was constructed at a trailhead in Hacienda Heights to treat runoff before it reached the storm drain and provide habitat for wildlife. A Trail Plan has also been completed that will minimize the effects of unauthorized trail use (i.e., building new trails and going off trail) and facilitate coordination with Southern California Edison (SCE), the Los Angeles County Fire Department (LACFD), and the Los Angeles County Department of Parks and Recreation on how to maintain roads and trails properly. Many of the roads within the Preserve are maintained by SCE and LACFD and are not under the jurisdiction of the Habitat Authority. The Trail Plan, along with other Best Management Practices (BMPs), will help to minimize impacts to water quality. Ongoing restoration of both upland and riparian habitats will also reduce both the nutrient and coliform loading potential downstream.

2.3.4 Climate

The Puente Hills are located within the South Coast Air Basin (SCAB), bounded by the Pacific Ocean on the west and the San Gabriel, San Bernardino, and San Jacinto Mountains on the north and east. The regional climate in the SCAB is classified as Mediterranean, characterized by warm, dry summers and mild, moist winters. The warmest month of the year is July and the coldest is January. Although the climate is considered semiarid, the marine layer keeps the air near the land surface

moist on most days. Annual average relative humidity is 71 percent along the coast and 59 percent inland.

More than 90 percent of rainfall in the SCAB occurs from November through April. The majority of precipitation is in the form of rain. Monthly and yearly precipitation is extremely variable. Average annual rainfall along the San Gabriel River corridor varies from approximately 28 inches in the San Gabriel Mountains, to 18 inches in the San Gabriel Valley, to approximately 14 inches on the coastal plain. Average annual precipitation in the Puente Hills usually ranges from 14 to 18 inches. The topography of the Puente Hills influences the amount of rain that falls. Because air temperature decreases as elevation increases, a storm mass will release more water during a storm event over the Puente Hills because of the increase in elevation. The cool air is less able to hold water vapor; therefore, the Puente Hills receive slightly more rainfall than the Los Angeles basin. Due to the location and climate of the Puente Hills, streams flow during the cooler months and generally go dry or go beneath the surface during the warm summer months. The one exception to this is Sycamore Canyon, which is a perennial drainage with water flowing year-round.

2.3.5 Fire History

Southern California's Mediterranean climate presents ideal conditions for fire. The wet, mild winters and dry, hot summers provide a long growing season that produces an abundance of plant fuel. Fire suppression, heavy rains, and seasonal or prolonged drought all result in excessive plant fuel accumulation and the potential for catastrophic wildfire.

The Puente Hills have burned repeatedly in historic times, and the frequency and intervals between fires are likely reflected by the current vegetation on site. Burn data from the LACFD (2005) indicates that since 1928, over 50 fires larger than 2 acres have occurred in and adjacent to the Puente Hills (Table A). Fires larger than 2 acres have not occurred in the Preserve since 1995. Figure 3 depicts all fire events that have been recorded by the LACFD in the immediate vicinity of the Preserve from 1928 through 2005. The biggest of these, the Fullerton fire, burned over 3,000 acres of land to the east of the Preserve. Over the years, several other large (over 800 acres) fires have occurred within the Preserve boundaries, most notably Hacienda No. 162 fire (1945), the Catalina fire (1979), and the Turnbull fire (1989).

In 1998 and 1999, the LACFD experimented with controlled burns to reduce fuel loads in the Preserve. The burns were conducted only after predetermined boundaries had been set and the weather conditions (e.g., humidity and wind patterns) were observed. Opportune weather conditions allowed firefighters to better control flame lengths and heat. These burns ultimately had a detrimental effect on native habitat in the Preserve, killing native plant species and allowing for an invasion of opportunistic nonnative species in the cleared areas. Other prescribed burns have not since been attempted.

Table A: Recorded Fires in the Vicinity of the Preserve, 1928–2005 (2 acres or Larger)

Year	Fire Name	Acres
1928	Shell Oil No. 11	91
1929	Workman No. 89	307
1930		243
1939	La Habra Fire No. 33	1,521
1944	Howard	147
1945	Hacienda No. 162	856
1946	Pellisier No. 180	348
1948	Turnbull Canyon Fire	180
1949		19
1949	Savage Canyon	1,681
1949	Clark No. 81	446
1949	Vejar No. 168	122
1950		280
1955		195
1955	Hacienda Fire	1,148
1956		9
1956		19
1959		10
1963		2
1966		23
1967	Turnbull II Fire	1,741
1967	Powder Fire	245
1967		9
1968	Old Canyon Fire	108
1970	Hacienda Fire	176
1970	Fullerton Fire	3,381
1970	Colima Fire	323
1970		3
1970		20
1970		2
1970		37
1970		4
1970		13
1971		19
1972		13
1973		83
1973		24
1974		16
1975		64
1976	Puente Hills Fire	311
1976		57
1976		17
1978	King Fire	125

Year	Fire Name	Acres
1978		81
1979	Catalina Fire	886
1981		194
1984		35
1987		53
1989	Turnbull Fire	1,229
1989		4
1989		4
1989		3
1992	Azusa Fire 26 Acres	35
1992	Workman Fire	44
1994	Skyline Fire	2
1995	Puente Hills Fire	107
1998	Turnbull Canyon–Rose Hills	10
1998/1999	Chevron–Prescribed Burns	247
2001	Powder Canyon	8
2002	Hellman Park	3
2003	Turnbull Canyon–Orlearts	8
2003	Hellman Park	2

2.4 RECREATIONAL RESOURCES

Due to the Preserve's proximity to urban areas, local residents and visitors have historically been drawn to the Puente Hills to enjoy the varied topography, steep hillsides, deep canyons, and views of the San Gabriel Mountains, the Pacific Ocean, and the urbanized Los Angeles metropolitan area (National Park Service Rivers & Trails Conservation Assistance Program 2004). Public access has never been formally permitted except on the Los Angeles County Schabarum Trail and its feeder trails in Hacienda Heights. Other trails were used over private property with or without the knowledge of the owners. The Habitat Authority continues to permit a variety of recreation uses, including hiking, jogging, mountain biking, equestrian use, nature viewing, bird watching, and outdoor education on portions of the extensive network of existing roads and trails through the Preserve.

Historically, the area was used for agriculture, ranching, oil extraction, and other purposes. Farmers, ranchers, and oil corporations carved numerous trails and roads through the landscape to provide access to remote sites from their facilities located at lower elevations (National Park Service Rivers & Trails Conservation Assistance Program 2004). Since that time, utility companies, including SCE, local water districts, fire departments, and others have also constructed service roads for access to transmission lines and for fire protection. These roads constitute the majority of an existing trail system of the Preserve. In addition, a long history of uncontrolled access, coupled with increased recreational use, has facilitated the development of visitor-created unauthorized trails and shortcuts.

The Preserve currently includes trails that provide for public access and recreation. The ratio of trails to open space within the Preserve is high in comparison to other managed natural areas. Eliminating many of the historically well-used trails is a significant practical challenge. The intent of the Habitat Authority is to continually monitor and manage the trails in order to balance recreation with the health of the ecosystem.

The Schabarum Trail (Skyline Trail), located on the prominent ridge running the width of the Preserve, is a regional facility that extends 12 miles between Workman Mill and Colima Roads. The Schabarum Trail is part of a larger system connecting the Rio Hondo and San Gabriel Rivers and foothills of the San Gabriel Mountains at La Verne (National Park Service Rivers & Trails Conservation Assistance Program 2004). The trail consists of numerous segments and is accessed via multiple trailheads both on and off Preserve property. The Schabarum Trail is part of the Los Angeles County trail system and is maintained by Los Angeles County Department of Parks and Recreation. The trail is included here insofar as it is located within the Preserve and serves as the spine for trail connections to the Preserve.

For clarity, the Preserve has been divided into seven primary use areas based on points of access and trail use. A summary of the trail system and recreation resources in each of these use areas is provided below. (For more detailed information on the condition of all the trail segments in the Preserve, refer to the Trail Condition Assessment in Appendix C.)

2.4.1 Sycamore Canyon/Hellman Park

This area forms the northwest portion of the Preserve, lying just south and adjacent to Rose Hills Memorial Park. Two trailheads provide primary access to this area: one at Workman Mill Road, the other in Hellman Park. This area contains several old roads that are heavily used, particularly by

mountain bikers, as part of a loop through Turnbull Canyon. Many of these roads lead off of the Preserve and into Rose Hills Memorial Park.

2.4.2 Hacienda Hills/Puma, Toyon, and Coyote Canyons

This area (formerly known as Canyons 6, 7, and 8) encompasses the steep terrain between the residential development of Hacienda Heights to the ridgeline and the Schabarum Trail (Skyline Trail). Primary use is from local residents; this is their only formal access point to the Preserve. A trailhead project has recently been completed at the intersection of 7th and Orange Grove Avenues. The Hacienda Hills trailhead provides a gate, parking, Americans with Disabilities Act (ADA) access, a horse stepover, and a restroom. There are no other formal access points in this area.

2.4.3 Turnbull Canyon

Turnbull Canyon includes areas of the Preserve south of Sycamore Canyon/Hellman Park and north of Worsham Canyon, east to the Schabarum Trail. This area is bisected by Turnbull Canyon Road, a two-lane road. The varied terrain and elevation provide opportunities for a unique trail experience and for scenic views of the surrounding landscape. As a result, this area is extremely popular, particularly with cyclists. The primary point of access is off of Turnbull Canyon Road and from Schabarum Trail to the east. The gated access point includes signage but no parking area; trail users park along the road shoulder. Historic use of voluntary trails, especially those by mountain bikers, have created negative impacts to soils and habitat as well as created safety concerns for other visitors.

2.4.4 Worsham Canyon

Worsham Canyon encompasses the area between Turnbull Canyon to the north and Arroyo Pescadero to the south. It is the primary point of entry for Whittier College students to access the Preserve. This area lacks a trailhead and/or a suitable point of access. Users currently access the site illegally through land owned by the City of Whittier and managed by the Los Angeles County Department of Public Works.

2.4.5 Arroyo Pescadero

This former oil field site features a number of old oil company roads and areas of heavily disturbed landscape dominated by nonnative vegetation, including eucalyptus, Brazilian pepper, and castor bean. Several restoration projects are currently underway in this area. One of the Preserve's most heavily used trails is accessed via the Arroyo Pescadero Trailhead. The trailhead provides a gate, restroom, parking, water, and equestrian staging for trail users. A number of unofficial points access into this use area. A rammed-earthen amphitheater has recently been constructed for use as an environmental outdoor classroom or as a rest area for hikers.

2.4.6 Hacienda Road East/Arroyo San Miguel

This area consists of several small parcels linked together by the Schabarum Trail to connect Arroyo Pescadero and Powder Canyon. As a result, many of the trails in this area lie only partially within the

Preserve. Seasonally, a trailhead on the east side of Colima is opened during Little League season. Access to this area is gained via trails from other areas such as the Arroyo Pescadero. A number of unofficial points access into this use area.

2.4.7 Powder Canyon

Powder Canyon lies at the eastern extent of the Preserve. Several trails cross into the Preserve from Schabarum Park to the north and intersect with Preserve trails. Access may also be gained to Powder Canyon by means of the Schabarum Trail from the west. The Powder Canyon Trailhead provides a gate, parking, equestrian staging, bathroom, drinking fountains, and warm-up ring. A number of unofficial points access into this use area.

2.5 INTERPRETATION AND EDUCATION

The Habitat Authority utilizes a comprehensive interpretative program to convey information about the Preserve through interpretive displays and programs, including panels, kiosks, and signs along with interactive outreach programs such as the Junior Ranger Program. The Habitat Authority provides the public with trail maps, public safety information, and the Preserve rules, along with descriptions of local wildlife, habitats, and the environmental values of the Puente Hills area.

2.5.1 Interpretive Panels

Interpretive panels are valuable tools to educate the public about wildlife habitat, habitat restoration, environmentally sensitive areas, and coexisting with wildlife. Currently, interpretive panels are located at Arroyo Pescadero and Hacienda Hills Trailhead; these panels focus on the plants and wildlife of the local area.

2.5.2 Kiosks

Information kiosks convey information and communicate with Preserve users. Five information kiosks currently exist throughout the Preserve at the following locations:

- Arroyo Pescadero
- Sycamore Canyon
- Powder Canyon
- Hacienda Hills
- Hellman Park

The kiosks address a variety of topics, including rules and regulations regarding use of roads and trails, maps of the Preserve, upcoming educational programs, wildlife information, emergency phone numbers, and phone numbers to report incidents of trail conflicts and hazards.

2.5.3 Signs

Information signs are posted throughout the property to convey information about the Preserve. Signs are used to post use restrictions, Preserve regulations, or other important information.

2.5.4 Educational Programs

To date, the Preserve has offered the following educational programs to the public.

Junior Ranger Program. The Mountains Recreation and Conservation Authority, contracted by and in conjunction with the Habitat Authority, first offered the Junior Ranger Program as an opportunity for children from ages 8 to 16 to learn about their local natural environment. The first program started in September 1999 as an outreach to all surrounding communities. Every Saturday for 6 weeks, the rangers chose to meet at a different location within the Preserve with approximately 20 junior rangers attending. In September 2000, the first school program began with 160 children. Since then, the structure of the program has been better adapted to fit the timing and educational needs of the schools. As of January 2007, the Rangers averaged 480 students per school year, with a total of 3,021 children having gone through the program.

The Program is specifically designed for children with little or no experience with the natural world. The program offers a unique combination of environmental science, outdoor skills, learning by experience, and leadership activities. The nature courses and outdoor projects are designed to meet California curriculum standards in a variety of natural science and cultural-related subjects such as mammals, birds, plants, native cultures, geology, survival skills (map and compass navigation), biodiversity, fire ecology, reptiles, and amphibians. Participants who complete the program receive an official Junior Ranger badge and a Junior Ranger certificate.

The Habitat Authority has also hosted a program on several occasions designed to introduce residents, especially neighbors, to the wildlife they may see in the Preserve. Presentations feature live wild animals native to the Puente Hills and San Gabriel Mountains, including mountain lions, bobcats, skunks, opossums, owls, and hawks. Participants receive free publications outlining informed lifestyle choices for residents who live in communities adjacent to wilderness areas.

The program introduces concepts related to coexisting with the native wildlife and habitat. Healthy ecosystems reduce the incidence of disease, provide clean air and water, and lessen the probability of conflict with wildlife. With proper information and action, homeowners can improve the safety of their families, pets, and livestock. People can enjoy living next to wilderness without unknowingly inviting nature to move into their homes. The program promotes public understanding of the value of wildlife and habitat and offers ways to reduce human-wildlife conflicts and encourage lifestyle changes that foster stewardship of the natural heritage. Residents can ultimately make informed decisions that maintain the community's natural character for generations to come.

Other Programs. Other programs previously offered by the Habitat Authority included special outreach events for all audiences, ranging from young toddlers to seniors. These programs are designed to foster stewardship; instill appreciation for the outdoors; educate about the native flora,

fauna, and history of the area; and involve the community in larger regional and national preservation activities. Programs have been offered in the form of Tikes Hikes, Ask the Expert Lecture series, solstice campfires, maintenance days for high school-required service learning hours, and other special educational events. The Tikes Hikes exposed toddlers to topics such as coyotes and owls in a variety of fun learning styles using picture books, songs, and stuffed animal puppets. The Ask the Expert Lecture series was offered to introduce local residents to coexisting techniques for local wildlife they may encounter at their home or on the trail. Topics included living with skunks and birds of prey. A sense of stewardship was encouraged with the maintenance day projects. Volunteers helped to remove weeds, paint parking lot curbs, and clean up trailheads. The winter and summer solstice campfires offered professional storytelling about folklore for local residents to enjoy at local parks outside of the Preserve. Due to limited staffing, these programs have been suspended. The Habitat Authority would like to offer similar type outdoor educational programs in the future.

2.5.5 Ranger Presentations

As requested, the Rangers have made many presentations to various community groups about the activities of the Preserve. These visits include showing short films either about preservation efforts within the Puente-Chino Hills Wildlife Corridor or about coexisting with wildlife and living on the urban edge. Also, Rangers work with local Girl Scout and Boy Scout troops in obtaining various patches and completing Eagle Scout projects.

2.6 EXISTING FACILITIES

Public facilities such as kiosks, trail markers, and interpretive signs enhance visitors' experience by offering directional information as well as information about site resources and local history. Public facilities in the Preserve consist mainly of trails, parking, and signs. As described above, the Preserve is accessed via five formal trailheads located at Workman Mill Road, Hellman Park, Hacienda Hills Trailhead, Arroyo Pescadero, and Powder Canyon. Facilities provided at these trailheads include gates, parking, ADA access, decomposed granite trails, horse stepovers, equestrian staging, interpretive panels, directional signs, restrooms, water, monument signs, fencing, and a warm-up ring. Signs in the Preserve are located mainly at trailheads and parking areas. Additional facilities include four structures currently used as living quarters, storage units, and a barn.

3.0 NATURAL RESOURCES

3.1 VEGETATION COMMUNITIES AND WILDLIFE HABITAT

The vegetation within the Preserve is a complex mosaic of different habitat types. Soils, aspect, slope, hydrology, fire, and other factors influence the distribution of vegetation communities and habitats. These factors, along with the Mediterranean climate of Southern California, allow a large degree of vegetation complexity within a relatively small area. In addition, a substantial number of the vegetation communities within the Preserve are unique to coastal Southern California and are considered globally sensitive. These vegetation communities often support sensitive, threatened, or endangered wildlife species threatened by urban development in the Southern California region. These Preserve habitats represent a substantial addition to protected lands regionwide and significantly contribute to the conservation of biodiversity. Some areas impacted by human activities represent important habitat for many native species, while other areas need management to improve the habitat quality of the vegetation.

In the report on the plant communities of the Puente Hills Preserve, BonTerra (2004) identified 9 major vegetation types composed of 61 distinct vegetation communities with reference to the County of Orange Habitat Classification System (HCS), Preliminary Descriptions of Terrestrial Natural Communities of California (Holland 1986), and to a lesser extent, Sawyer and Keeler-Wolf (1995), which provide specific criteria for distinguishing among habitat types. A total of 35 of these communities are considered sensitive by State and/or local agencies.

The primary vegetation types in the Preserve (Figure 4), listed with total acreage, are as follows:

- **Coastal Sage Scrub:** 845.31 acres
- **Chaparral:** 975.91 acres
- **Grassland:** 1,224.19 acres
- **Riparian:** 143.55 acres
- **Woodland:** 296.85 acres
- **Cliff and Rock:** 0.58 acre
- **Agriculture:** 15.54 acres
- **Developed and Disturbed:** 299.23 acres

The discussion below highlights the species characteristic of the Preserve, grouped by vegetation type, and also includes information on wildlife and rare plant and animal species. Table B provides a detailed listing of all 61 vegetation communities, using the coding system of the Orange County Vegetation Classification System (Gray and Bramlet 1992) accompanied by acreage totals. Primary vegetation communities are summarized in the following sections, with an accompanying detailed discussion provided in Appendix D. Appendix E lists the plant species documented within the

Table B: Existing Vegetation Communities within the Preserve¹

Vegetation Type	Acreage
Coastal Sage Scrub	
2.3.1: Sagebrush-buckwheat scrub	109.50
2.3.1/3.12: Sagebrush-buckwheat scrub/Toyon-sumac chaparral	4.81
2.3.2: Sagebrush-monkey flower scrub	4.81
2.3.3: Purple sage scrub	186.36
2.3.3/3.12: Purple sage scrub/Toyon-sumac chaparral	13.87
2.3.4: Black sage scrub	118.95
2.3.4/3.12: Black sage scrub/Toyon-sumac chaparral	7.70
2.3.6: Sagebrush scrub	222.89
2.3.6/3.12: Sagebrush scrub/Toyon-sumac chaparral	6.04
2.3.7: Buckwheat scrub	3.98
2.3.9: Coyote brush scrub	36.35
2.3.10: Mixed sage scrub	5.33
2.3.13: Encelia scrub	6.18
2.4: Cactus scrub	9.02
2.8.3: Coastal isocoma scrub/Grassland ecotone	1.40
2.8.5: Mixed sage scrub/Grassland ecotone	105.98
2.10: Revegetated sage scrub	2.14
Subtotal Coastal Sage Scrub	845.31
Chaparral	
3.12: Toyon-sumac chaparral	874.78
3.12/2.3.1: Toyon-sumac chaparral/Sagebrush-buckwheat scrub	13.00
3.12/2.3.3: Toyon-sumac chaparral/Purple sage scrub	5.51
3.12/2.3.4: Toyon-sumac chaparral/Black sage scrub	8.05
3.12/2.3.6: Toyon-sumac chaparral/Sagebrush scrub	15.86
3.12/4.1: Toyon-sumac chaparral/Annual grassland	57.80
3.12/15.5: Toyon-sumac chaparral/Ornamental plantings	0.91
Subtotal Chaparral	975.91
Grassland	
4.1: Annual grassland	1152.02
4.2: Wild rye grassland	7.46
4.3: Needlegrass grassland	8.06
4.6: Ruderal	24.78
4.6.1: Tree tobacco stands	1.56
4.6.2: Castor bean stands	2.23
4.13: Annual grassland/Sage scrub restoration	28.08
Subtotal Grassland	1224.19
Riparian	
7.0: Riparian habitats	1.18
7.1: Riparian herb	0.46
7.2: Willow riparian scrub	34.64
7.3: Mulefat scrub	35.62

¹ This data was current as of February 2005 and does not include vegetation data for any new parcels obtained by the Habitat Authority after this date. These parcels are without data in some of the figures contained in this RMP.

Table B: Existing Vegetation Communities within the Preserve¹

Vegetation Type	Acreage
7.3/3.12: Mulefat scrub/Toyon-sumac chaparral	1.99
7.3/15.5: Mulefat scrub/Ornamental plantings	0.20
7.4: Sycamore riparian woodland	13.40
7.4/7.5: Sycamore riparian woodland/Coast live oak riparian forest	16.65
7.5: Coast live oak riparian forest	26.47
7.5/7.4: Coast live oak riparian forest/Sycamore riparian woodland	12.94
Subtotal Riparian	143.55
Woodland	
8.1: Coast live oak woodland	211.83
8.1/8.2: Coast live oak woodland/Walnut woodland	40.16
8.1/15.5: Coast live oak woodland/Ornamental plantings	0.22
8.4: Mexican elderberry woodland	27.60
8.2: Walnut woodland	16.93
8.4/15.5: Mexican elderberry woodland/Ornamental planting	0.11
Subtotal Woodland	296.85
Cliff and Rock	
10.1: Xeric cliff faces	0.58
Subtotal Cliff and Rock	0.58
Agriculture	
14.3.1: Orchards (Decommissioned)	15.22
14.3.2: Vineyards (Decommissioned)	0.32
Subtotal Agriculture	15.54
Developed	
15.1: Urban	2.42
15.2: Rural residential	2.11
15.3: Nonurban commercial/Industrial	1.53
15.4: Transportation	30.36
15.5: Ornamental plantings	77.07
15.5.1: Eucalyptus woodland/Forest	88.60
15.5.2: Acacia woodland/Forest	0.93
15.5.3: Black locust woodland/Forest	0.68
15.5.4: Peruvian pepper woodland	1.03
Subtotal Developed	204.73
Disturbed	
16.1: Cleared or graded	94.50
Subtotal Disturbed	94.50
TOTAL ACRES	3,793.06

Preserve and Appendix F lists all animals observed and those that could potentially occur in the Preserve.

3.1.1 Coastal Sage Scrub Communities (845 acres)

Coastal sage scrub communities occupy a narrow range at low elevations along the coast from central California to a point about one-third of the way down the Baja California Peninsula. This overlap with California's most populous areas has resulted in a dramatic loss of this habitat and considerable conservation efforts over the last 20 years. The Preserve's coastal sage scrub is especially valuable in this regard.

The coastal sage scrub communities consist primarily of low-growing, drought-tolerant native shrubland communities. These typically occur at lower, drier sites than where chaparral occurs and are scattered throughout the Preserve in relatively small patches on ridgetops and hillsides, interspersed with the more common chaparral habitat (LSA 2000). The most extensive tracts of coastal sage scrub exist in portions of Turnbull Canyon, Arroyo Pescadero, La Cañada Verde Canyon, Arroyo San Miguel, Powder Canyon, and throughout Sycamore Canyon.

The variety of coastal sage scrub communities in the Preserve includes sagebrush-buckwheat scrub, sagebrush-buckwheat scrub/toyon-sumac chaparral, sagebrush-monkey flower scrub, purple sage scrub, purple sage scrub/toyon-sumac chaparral, black sage scrub, black sage scrub/toyon-sumac chaparral, sagebrush scrub, sagebrush scrub/toyon-sumac chaparral, buckwheat scrub, coyote brush scrub, mixed sage scrub, encelia scrub, cactus scrub, coastal isocoma scrub/grassland ecotone, mixed sage scrub/grassland ecotone, and revegetated sage scrub.

Although the plant composition varies between the communities, the dominant shrubs in the coastal sage scrub habitat tend to be California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), purple sage (*Salvia leucophylla*), black sage (*Salvia mellifera*), coyote brush (*Baccharis pilularis*), and California bush sunflower (*Encelia californica*). Other common species include poison oak (*Toxicodendron diversilobum*) and orange bush monkey flower (*Mimulus aurantiacus*). Nonnative species like ripgut brome (*Bromus diandrus*), black mustard (*Brassica nigra*), and Italian thistle (*Carduus pycnocephalus*) are often present in coastal sage scrub habitat. Exotic plant species are discussed in additional detail in Section 3.2.1, and management guidelines are presented in the Conservation Management component (Sections 5.0 and 6.0) of this RMP.

Coastal sage scrub is a structurally diverse vegetation community where animals have numerous opportunities to find food and shelter. Sensitive species are associated with this vegetation community such as the federally threatened coastal California gnatcatcher. These songbirds are rare and local in the Preserve. Other bird species associated with this habitat are also of local interest: the greater roadrunner (*Geococcyx californianus*), Costa's hummingbird (*Calypte costae*), cactus wren, and Southern California rufous-crowned sparrow (*Aimophila ruficeps*).

Rodents can be especially common in coastal sage scrub, with the Botta's pocket gopher (*Thomomys bottae*), California pocket mouse (*Chaetodipus californicus*), western harvest mouse (*Reithrodontomys megalotis*), and deer mouse (*Peromyscus maniculatus*) among the most common local species. Two rodent species associated with coastal sage scrub in particular are the cactus mouse

(*Peromyscus eremicus*) and the San Diego desert woodrat (*Neotoma lepida intermedia*), a California Species of Special Concern. The ornate shrew (*Sorex ornatus*) and desert cottontail (*Sylvilagus audubonii*) are often abundant in this habitat. A range of larger mammals such as mule deer (*Odocoileus hemionus*) and coyote (*Canis latrans*) roam here as well.

Reptiles are also well-represented in coastal sage scrub, with species such as the western fence lizard (*Sceloporus occidentalis*), coastal western whiptail (*Aspidoscelis tigris multiscutatus*), southern alligator lizard (*Elgaria multicarinata*), California whipsnake (*Masticophis lateralis*), and gopher snake (*Pituophis catenifer*) among the most common in the Preserve. One California Species of Special Concern in the Preserve, the northern red-diamond rattlesnake (*Crotalus ruber*), is closely associated with coastal sage scrub habitat. Although moisture is limited, the western toad (*Bufo boreas*), Pacific chorusfrog (*Pseudacris regilla*), and slender salamander (*Batrachoseps major*) are among the amphibian species present, at least seasonally.

3.1.2 Chaparral (975 acres)

Chaparral is widespread on California foothills and often impacted by development. Chaparral vegetation is typically made up of large, dark-green sclerophyllous shrubs (i.e., hard leaves with a short distance between leaves along the stem), which are usually 2–3 m in height (Ljubenkov and Ross 2001). This habitat type is found on steep north- and east-facing slopes in the vicinity of Whittier Hills and most of the steeper slopes in the vicinity of Turnbull Canyon (LSA 2000, Ljubenkov and Ross 2001). In some areas, chaparral exists in patchy association with coastal sage scrub. Large stands of chaparral are located near Powder Canyon and in close proximity to Arroyo San Miguel just east of Colima Road. Smaller stands of chaparral exist near Hacienda Heights.

Seven different chaparral vegetation communities are discussed in detail in Appendix D. Toyon-sumac chaparral best characterizes the chaparral in the Preserve, while the remaining six vegetation types are variations: toyon-sumac chaparral/sagebrush-buckwheat scrub, toyon-sumac chaparral/purple sage scrub, toyon-sumac chaparral/black sage scrub, toyon-sumac chaparral/sagebrush scrub, toyon-sumac chaparral/annual grassland, and toyon-sumac chaparral/ornamental plantings.

Toyon-sumac chaparral is typically composed of larger chaparral species, often interspersed with coastal sage scrub shrubs. Characteristic species in this community consist of lemonadeberry (*Rhus integrifolia*), laurel sumac (*Malosma laurina*), toyon (*Heteromeles arbutifolia*), holly-leaved redberry (*Rhamnus ilicifolia*), and Mexican elderberry (*Sambucus mexicana*). The coastal sage scrub species in this habitat type include orangebush monkey flower, coyote brush, California sagebrush, giant wild rye (*Leymus condensatus*), purple sage, chaparral bedstraw (*Galium angustifolium*), and black sage. It is not uncommon for poison oak to grow in dense thickets on these slopes, which is often observed on the ground and climbing, as a vine, into the shrubs in this habitat. Other vines in this habitat type include man root (*Marah macrocarpa*) and pipestem (*Clematis lasiantha*). Chaparral is mapped in large areas throughout the Preserve across all soil associations and all aspects within the Preserve.

Chaparral is generally transitional between coastal sage scrub and woodland habitats in terms of structure and moisture content. Because of this, many of the bird species found in coastal sage scrub also occur here, but some species such as the coastal California gnatcatcher become almost nonexistent. Other species like the wrentit (*Chamaea fasciata*) and California thrasher (*Toxostoma*

redivivum), a California Special Animal, reach maximum abundance in chaparral. The hermit thrush (*Catharus guttatus*), yellow-rumped warbler (*Dendroica coronata*), and golden-crowned sparrow (*Zonotrichia atricapilla*) are among the common species that migrate into the area for the nonbreeding seasons.

Rodents are common in chaparral, with species such as the California mouse (*Peromyscus californicus*) and dusky-footed woodrat (*Neotoma fuscipes*) being especially numerous in the Preserve. Most of the larger wide-ranging mammals also occur in chaparral, with species such as the bobcat (*Lynx rufus*) and gray fox (*Urocyon cinereoargenteus*) potentially reaching maximum densities.

Reptiles and amphibians of the chaparral are similar to those of coastal sage scrub, with certain species more or less common depending on their preference for more or less cover. The California whipsnake is most closely associated with this habitat.

3.1.3 Grassland (1,224 acres)

California's "Valley Grasslands" are found in the Central Valley and surrounding foothills and on the coastal slope from about the San Francisco Bay Area southward. Over the last 200 years the very nature of this community changed from one dominated by native perennial grasses to one dominated by nonnative annual grasses. By this measure, remnant native grassland is the major habitat type most reduced in California. Nevertheless, annual grasslands provide habitat for many wildlife species, particularly raptors. Now, much of California's annual grassland has been lost to agriculture and urban development. Therefore, the Preserve provides valuable habitat for the region's grassland-dependent species.

The Preserve contains large areas of annual grassland, typically on flat or mildly sloping areas where maximum sunlight occurs (Ljubenkov and Ross 2001). Grasslands are well-developed on deep, fine-textured soils, but are not restricted to such conditions (Keeley 1990). This community is principally characterized by nonnative annual grasses of exotic origin, but native species including wildflowers often mix with the dominant exotic grasses. These grasslands were created by disturbances such as farming, grazing, fire, or grading for firebreaks (Ljubenkov and Ross 2001). The most common grass species include ripgut brome, slender wild oat (*Avena barbata*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), red brome (*Bromus madritensis* ssp. *rubens*), soft chess (*Bromus hordeaceus*), wild oat (*Avena fatua*), perennial wild rye (*Lolium perenne*), and foxtail fescue (*Vulpia myuros*).

Common native forbs in this community consist of miniature lupine (*Lupinus bicolor*), common fiddleneck (*Amsinckia menziesii*), weak-leaved burweed (*Ambrosia confertiflora*), narrow-leaved milkweed (*Asclepias fasciculatus*), fascicled tarweed (*Deinandra fasciculata*), arroyo lupine (*Lupinus succulentus*), dove weed (*Croton setigerus*), blue-eyed grass (*Sisyrinchium bellum*), Southern California locoweed (*Astragalus trichopodus*), blue dicks (*Dichelostemma capitatum* ssp. *capitatum*), coyote melon (*Cucurbita foetidissima*), and big gumplant (*Grindelia robusta*). Nonnative exotic forb species are also represented in grassland habitat: summer mustard (*Hirschfeldia incana*), black mustard, bur clover (*Medicago polymorpha*), red-stemmed filaree (*Erodium cicutarium*), common sow thistle (*Sonchus oleraceus*), tocalote (*Centaurea melitensis*), white-stemmed filaree (*Erodium moschatum*), long-beaked filaree (*Erodium botrys*), and horehound (*Marrubium vulgare*).

Subshrubs and shrubs are occasionally found in these grasslands and usually consist of grassland goldenbush (*Ericameria palmeri* ssp. *pachylepis*), coastal isocoma (*Isocoma menziesii* var. *vernonioides*), common sandaster (*Lessingia filaginifolia*), and California sagebrush.

Other communities, which are functionally classified as grassland within the Preserve, but to a far lesser extent than annual grassland, include wild rye grassland, needlegrass grassland, ruderal (dominated by nonnative exotic forbs), nonnative tree tobacco stands (*Nicotiana glauca*), nonnative castor bean stands (*Ricinus communis*), and annual grassland/sage scrub restoration. Purple needlegrass (*Nassella pulchra*), which occurs in the needlegrass grassland community, is significant because it is a key component of California's few remaining native grasslands. Additional information on the existing grassland communities in the Preserve is included in Appendix D.

Many wildlife species use this habitat, but the lack of vegetative structure generally results in the presence of fewer species than in more structurally diverse habitats. Raptors are commonly associated with grasslands, where they primarily feed on rodents, birds, reptiles, insects, and other invertebrates. In the Puente Hills, the turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and great horned owl (*Bubo virginianus*) are the most common species in this group. Passerine birds are generally less common during the nesting season, but otherwise may be very common, when species such as the mourning dove (*Zeniada macroura*) and house finch (*Carpodacus mexicanus*) disperse from nearby areas and others like Say's phoebe (*Sayornis saya*), American pipit (*Anthus rubescens*), and Savannah sparrow (*Passerculus sandwichensis*) arrive from breeding grounds to the north. Grasslands are the preferred habitat for several sensitive bird species: the white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), loggerhead shrike (*Lanius ludovicianus*), California horned lark (*Eremophila alpestris*), and lark sparrow (*Chondestes grammacus*).

Rodent species such as the California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher, western harvest mouse, deer mouse, and California vole (*Microtus californicus*) are the most numerous mammal species of the Preserve's grasslands. These rodents serve as food for the raptors discussed above as well as for snakes and larger mammals such as coyotes.

Snakes such as gopher snake and western rattlesnake (*Crotalus viridis*) are the reptiles most commonly associated with local grasslands. The western fence lizard is also common in grasslands. Amphibian species such as the western toad and Pacific chorusfrog are also surprisingly common, when weather conditions allow these moisture-dependent species to wander. Grassland habitat also supports the western spadefoot (*Spea hammondi*), which is a California Species of Special Concern.

3.1.4 Riparian (143 acres)

This general category includes everything from riparian herb habitat to willow and mulefat scrub to sycamore riparian woodland and coast live oak riparian forest. Of the 143 acres identified in the Preserve, about half consist of willow and mulefat scrub and the other half consists of coast live oak and sycamore woodland and forest. Because of available moisture, riparian habitats are especially valuable for many wildlife species and support one of the most diverse ecological communities of plants and animals.

The amount of riparian habitat, like all wetland habitats, has been reduced greatly in California. Fortunately, due to strict wetland regulations and increased urban runoff, this trend has been reversed in southwestern California. The availability of moisture in riparian habitat makes it especially valuable in arid regions such as Southern California. In addition to supporting many nesting sensitive species, riparian habitat is used heavily by migrating songbirds, many traveling to and from the Neotropics.

Riparian habitat is found along the perennial or ephemeral stream channels within the Preserve and is characterized by dense tree cover or a lush growth of herbaceous plant species. Arroyo willow (*Salix lasiolepis*), western sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*), and mulefat (*Baccharis salicifolia*) are common woody species in the Preserve's riparian areas. These species are located along streambeds in Hacienda Hills, Arroyo Pescadero, Arroyo San Miguel, and Sycamore Canyon. Of the 10 riparian vegetation communities that were mapped, willow riparian scrub, mulefat scrub, and coast live oak riparian forest were the most widespread. These 3 are briefly discussed below, while all 10 communities are described in further detail in Appendix D.

The willow riparian scrub habitat occurs within the major drainages throughout the Preserve, including Powder Canyon, Arroyo San Miguel, Arroyo Pescadero, La Cañada Verde, Worsham Canyon, and Turnbull Canyon, and includes stands of arroyo willow and red willow trees (*Salix laevigata*) with some black willow (*Salix gooddingii*). Mulefat scrub habitat is typically composed of dense, monotypic stands of mulefat in ephemeral to perennial stream channels. Other shrubs found in this community include coyote brush, Mexican elderberry, laurel sumac, giant wild rye, poison oak, and coastal isocoma. Oak riparian forest was mapped along some of the larger drainages such as Powder Canyon Creek, as well as in Puma, Toyon, and Coyote Canyons of the Hacienda Hills. The canopy of this habitat type is primarily composed of coast live oak. Other trees or large shrubs observed beneath the oak canopy include Mexican elderberry, toyon, fuchsia-flowered gooseberry (*Ribes speciosum*), California wild rose (*Rosa californica*), holly-leaved redberry, and laurel sumac. In addition, poison oak is abundant both on the ground and within the canopy of this community. The understory varies between vegetation communities, yet nonnative annual grasses and forbs such as ripgut brome, milk thistle (*Silybum marianum*), Italian thistle, and poison hemlock (*Conium maculatum*) are common elements of these three major riparian habitats.

Several bird species are associated with willow and mulefat scrub in southwestern California, but the expansive bottomland conditions they prefer are not present in the Preserve. The yellow-breasted chat (*Icteria virens*), a California Species of Special Concern, is present locally in the Preserve during the breeding season, and one least Bell's vireo (*Vireo bellii pusillus*), federally and State listed as endangered, was present in Sycamore Canyon in 2005. Other bird species largely restricted to riparian areas in the Preserve include the black-chinned hummingbird (*Archilochus alexandri*), downy woodpecker (*Picoides pubescens*), Pacific-slope flycatcher (*Empidonax difficilis*), and American goldfinch (*Carduelis tristis*). Birds of the riparian woodland and forest are similar to those of the more widespread woodland habitat discussed in the following section, but sycamores are the largest native trees in the Preserve and provide excellent roosting and nesting sites for raptors and other species. As with woodland habitat, riparian habitat is used by many migrating songbirds.

Mammals of the riparian habitats in the Preserve are similar to those of woodland habitats, but the western red bat (*Lasiurus blossevillii*), a California Species of Special Concern; raccoon; Virginia

opossum; and various other bat species prefer these wetter habitats. The same is true of reptiles and amphibians, with amphibians responding favorably to conditions more to their liking.

3.1.5 Woodlands (296 acres)

Oak woodlands are found in many of the valleys and foothills of California, including many urban areas, but Californians' long-held fondness for oak trees has somewhat tempered the habitat loss that otherwise would have occurred. Walnut woodland has not been so blessed, suffering significant losses in its very limited range, restricted to southwestern California. Woodland habitat is naturally rare in lowland Southern California, making the Preserve's contribution especially valuable in the region for the suite of species dependent on it.

Coast live oak and Southern California black walnut (*Juglans californica* var. *californica*) are the dominant woodland community tree species in the Preserve. Coast live oak woodlands are typically located on north-facing slopes and grasslands with a canopy cover ranging from open to dense. Oak and walnut woodlands associated with streams are described under riparian vegetation communities, above. Powder Canyon, Turnbull Canyon, Hacienda Heights, and the Arroyos along Colima Road contain stands of coast live oak woodland. Other trees and shrubs found in oak woodland include Mexican elderberry, holly-leaved redberry, golden currant (*Ribes aureum*), lemonadeberry, toyon, fuchsia-flowered gooseberry, man root, heart-leaved penstemon (*Keckiella cordifolia*), and poison oak. A nonnative component includes riggut brome, milk thistle, Italian thistle, bur chervil (*Anthriscus caucalis*), black mustard, and chickweed (*Stellaria media*) in this habitat type.

Walnut woodland is dominated by Southern California black walnut and is fairly common in Powder Canyon. This habitat type was also mapped between Puma and Toyon Canyons of Hacienda Hills. Walnut woodland is often found mixed with coast live oak, Mexican elderberry, or other chaparral species. These woodlands often contain English walnut/black walnut hybrids, especially in areas with past industrial or rural residential uses. The subcanopy in this habitat type includes toyon, holly-leaved redberry, Mexican elderberry, poison oak, and fuchsia-flowered gooseberry. Many of these plants are important food sources for birds and other wildlife.

Although oak woodland and walnut woodland dominate the woodland communities, six variations of woodland habitat exist in the Preserve. Additional information on these habitats is included in Appendix D.

Woodlands provide habitat for woodland bird species such as the band-tailed pigeon (*Columba fasciata*), acorn woodpecker (*Melanerpes formicivorus*), Hutton's vireo (*Vireo huttoni*), and western scrub-jay (*Aphelocoma californica*). Trees also provide roosting and nesting sites for species such as the red-tailed hawk and great horned owl that forage largely over grasslands. The ruby-crowned kinglet (*Regulus calendula*) and yellow-rumped warbler are especially common in winter. Sensitive bird species associated with this habitat (and riparian) include Cooper's hawk (*Accipiter cooperii*) and nuttall's woodpecker (*Picoides nuttallii*). In addition, this habitat is widely used by migrating songbirds.

Rodent numbers and diversity are reduced in woodlands compared to brushy habitats, but species such as the brush mouse (*Peromyscus boylii*) (not confirmed in the Preserve) are largely dependent on oaks. Tree squirrels, including the western gray squirrel (*Sciurus griseus*) and nonnative eastern fox

squirrel (*Sciurus niger*), are restricted to woodlands. Larger mammals are also present, with the mule deer especially associated with oak woodland.

Like the rodents, reptile numbers and diversity are reduced in woodlands, with no species reaching maximum densities. In contrast, increased moisture retention allows for greater amphibian activity in woodlands; the arboreal salamander (*Aneides lugubris*) is generally most common in this habitat.

3.1.6 Cliff and Rock Communities (0.58 acre)

Cliff faces are found in Turnbull Canyon, Sycamore Canyon, and other isolated areas within the Preserve. In some instances, these cliffs contain some scattered occurrences of coastal sage scrub species, including California sagebrush, chaparral bedstraw, orangebush monkey flower, poison oak, lance-leaved dudleya (*Dudleya lanceolata*), and white sage (*Salvia apiana*). Grasses and forbs may occur on the steep slopes, and common species include red brome, cliff malacothrix (*Malacothrix saxatilis*), California figwort (*Scrophularia californica*), common phacelia (*Phacelia distans*), bicolored everlasting (*Gnaphalium bicolor*), punchbowl clarkia (*Clarkia bottae*), and perennial blue grass (*Poa secunda*).

3.1.7 Agricultural Communities (15 acres)

Decommissioned avocado (*Persea americana*) orchards are found at various locations within the Preserve, particularly in the southeastern portion of Powder Canyon. Additionally, small decommissioned vineyards can be found scattered throughout the Preserve. These orchards and vineyards are not actively managed or irrigated by the Habitat Authority, but are remnants from previous land owners.

3.1.8 Disturbed or Developed Communities (299 acres)

Disturbed and developed vegetation communities, as these terms are used in the habitat classification system, collectively refer to the areas that have been modified by humans. These include urban, rural residential, and commercial/industrial landscapes at the periphery of the Preserve; roads and trails within the Preserve; and stands of ornamental trees and shrubs, the most dominant being eucalyptus (*Eucalyptus* spp.) woodland. These eucalyptus stands appear predominantly in the southwestern portion of Whittier Hills open space and the western portion of Powder Canyon. Additionally, stands of ornamental acacias (*Acacia* spp.), black locust trees (*Robinia pseudoacacia*), and Peruvian pepper trees (*Schinus molle*) are found in or along Colima Road, Turnbull Canyon, and the southwestern portion of Whittier Hills open space (near Arroyo Pescadero), respectively.

Other ornamental and agricultural trees found along the margin of the Preserve or on lawns and playing fields within the Preserve boundaries include pines (*Pinus* spp.), olive (*Olea europaea*), English walnut (*Juglans regia*), common fig (*Ficus carica*), peach (*Prunus persicaria*), Mexican fan palm (*Washingtonia robusta*), Chinese elm (*Ulmus parviflora*), silk oak (*Grevillea robusta*), Catalina Island cherry (*Prunus lyonii*), oleander (*Nerium oleander*), cassia (*Cassia* sp.), jacaranda (*Jacaranda mimosifolia*), Mexican palo verde (*Parkinsonia aculeata*), aeonium (*Aeonium* sp.), lantana (*Lantana camera*), passion flower (*Passiflora edulis*), and pride of Madeira (*Echium fastuosum*).

Although nonnative, these habitats can provide canopy structure that mimics native woodlands in some respects and are used as nest sites by some songbirds and raptors such as Cooper's hawk, red-shouldered hawk (*Buteo lineatus*), red-tailed hawk, and great horned owl. Several Preserve species are associated with developed areas more than any other. These species include the gulls (near the landfills), American crow (*Corvus brachyrhynchos*), hooded oriole (*Icterus cucullatus*), western yellow bat (*Lasiurus xanthinus*) (palm specialists), and three nonnative species: rock (feral) pigeon (*Columba livia*), European starling (*Sturnus vulgaris*), and house sparrow (*Passer domesticus*). Although some wildlife species utilize these nonnative habitats, it has been at the expense of native vegetation and the corresponding native wildlife.

3.1.9 Intact Native Habitat

Although significant disturbances have occurred throughout the Preserve, large patches of good to high-quality habitat remain. Information regarding the intact habitat was collected by surveying the Preserve on foot and identifying habitat that has very little nonnative vegetation present. Sites and vegetation clusters were evaluated according to criteria including signs of good plant diversity, few exotic weeds, no signs of recent disturbance, and good overall habitat/community structure and sustainability. The fewer the weeds, the more intact the habitat or plant community is, since exotic weeds are an indication of past disturbance. The lack of weeds in the interstitial spaces between the large scrub plants is a good indication of the habitat's health and vigor, including its ability to withstand further invasion by exotic weeds. In most of the disturbed habitat throughout the Preserve, the interstitial spaces have a great deal of weeds present. In the healthier habitats that are more stable and diverse, there are very few to no weeds present in the interstitial spaces of the habitat.

Figure 5 shows where intact habitats are located throughout the Preserve. Portions of the high-quality habitat are on steep slopes where disturbance from human activity or past grazing practices has not occurred. The intact habitat areas are well-represented in Hacienda Hills, Turnbull Canyon, Hellman Park, the upper portions of La Canada Verde and Arroyo Pescadero, and portions of Powder Canyon. Most of the intact habitat is coastal sage scrub and chaparral, with woodland areas represented in Hacienda Hills and Powder Canyon. Restoration efforts can be focused on expanding these high-quality habitat islands and making connections to other nearby patches.

3.2 VEGETATION DYNAMICS

Natural vegetation is not static. Community composition and structure can slowly or rapidly change in response to prevailing physical, biological, and human-caused conditions or influences. The process of change in vegetation community composition and structure is termed *succession* (Gurevitch et al. 2002). The broader term "vegetation dynamics" refers to this process of succession and the associated influences that promote such changes. Exotic plant species and fire are two major factors that can rapidly change the structure and composition of the habitat in the Preserve and are discussed below. In addition, the consequences of regional and global changes in climate are likely to have large, though only partially predictable, effects on plant dynamics around the world and in the Preserve. Vegetation range shifts or range contractions and expansions are likely to occur in some areas, as changes take place not only in average temperatures, but in the length of the growing seasons, the duration of drought and extreme heat events, fire regimes, and soil moisture availability at different times of the year (Gurevitch et al. 2002).

3.2.1 Exotic Plant Species

California has become the adopted home of over 1,000 plant species from other parts of the world. Most of these originated in the Mediterranean, where the climate is similar to California's (Barbour et al. 1993). Invasive exotic plant species can change the landscape and the relationships between plant cover, the soil, and wildlife by outcompeting native plants. Most of California's exotic species are fast-growing annuals that prefer disturbed habitats and are prodigious seed producers (Barbour et al. 1993).

The California Invasive Plant Council (CalIPC) provides a list of exotic pest plants of greatest ecological concern in California. The list highlights nonnative plants that present serious problems in wildlands (natural areas that support native ecosystems, including national, State, and local parks; ecological reserves; wildlife areas; national forests; and Bureau of Land Management [BLM] lands). The list of invasive plants is constantly under revision by land managers, botanists, and researchers throughout the State. An updated list is available at the CalIPC Web site.¹ With input from the Habitat Authority, LSA developed a list of the highly invasive exotic species that are present and pose the highest threat to native habitat in the Puente Hills. These species are shown in Table C, along with the CalIPC classifications (Bossard et al. 2000). LSA also determined the distribution of exotic plant species in the Preserve. The methodology and results are summarized in the following sections, with a detailed discussion of both provided in Appendix G.

There are four CalIPC classifications:

- **High:** These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent on ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- **Limited:** These species are invasive but their ecological impacts are minor on a statewide level, or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low-to-moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
- **Red Alert:** Pest plants with potential to spread explosively; infestations are currently small or localized. If found, the CalIPC, County Agricultural Commissioner, or California Department of Food and Agriculture must be alerted.

¹ www.cal-ipc.org.

Table C: Highly Invasive Species Identified in the Puente Hills

Scientific Name	Common Name	CAL-IPC
<i>Tamarix</i> sp.	tamarisk	High
<i>Cortaderia selloan</i>	pampas grass	High
<i>Foeniculum vulgare</i>	fennel	High
<i>Pennisetum setaceum</i>	fountain grass	Moderate
<i>Eucalyptus</i> sp.	eucalyptus	Moderate
<i>Myoporum laetum</i>	myoporum	Moderate
<i>Schinus molle</i>	Peruvian pepper	Limited
<i>Brassica nigra</i>	black mustard	Moderate
<i>Robinia pseudoacacia</i>	black locust	Limited
<i>Carduus pycnocephalus</i>	Italian thistle	Moderate
<i>Cirsium arvense</i>	Canada thistle	Moderate
<i>Cirsium vulgare</i>	bull thistle	Moderate
<i>Phalaris aquatica</i>	harding grass	Moderate
<i>Ricinus communis</i>	Castor bean	Limited
<i>Schinus terebinthifolius</i>	Brazilian pepper	Limited
<i>Cynara cardunculus</i>	artichoke thistle	Moderate
<i>Conium maculatum</i>	poison hemlock	Moderate
Nonnative Grasses	NNG	Annual Grasses
<i>Bromus diandrus</i>	Rippgut brome	Moderate
<i>Nicotiana glauca</i>	tree tobacco	Moderate
<i>Acacia</i> sp.	Acacia	Limited
<i>Silybum marianum</i>	milk thistle	Limited

Exotic Species Mapping Methodology. LSA determined the dominant exotic species in the Preserve and their specific soil associations by utilizing existing vegetation maps and collecting additional data in annual grassland and ruderal habitats. The vegetation map included specific exotic vegetation categories such as acacia woodland forest, eucalyptus woodland forest, castor bean, tree tobacco, and Peruvian pepper woodland; as such, further mapping of these exotic species was not required.

However, because most of the exotic species are contained within the areas mapped as ruderal or annual grassland, further refinement of these previously mapped areas was necessary. Mapping occurred over several weeks in the months of October and November of 2004 in conjunction with soil sampling. Most of the dominant species were observable at this time of year. If the surveys had been conducted in the spring, a few additional species might have been observed, but the general results would still be very similar.

The minimum mapping unit was 1 acre. All polygons within the disturbed vegetation types over 1 acre were visited with field data collected for each polygon. Weed polygons were delineated based on the type of exotic species and extent of cover in a given area. If dead annuals were observed during the field mapping, their cover when alive was estimated. New weed polygons within the disturbed

habitat types were created if the suite of exotic species changed or if exotic species cover values changed.

Variables collected for each weed polygon consisted of weed polygon number, restoration access potential, erosion potential, disturbance factors, the top four dominant exotic species present, and percent cover value. Cover values for exotic species were assigned using the Daubenmire cover class (Bonham 1989). Cover class values are 0–5 percent, 6–25 percent, 26–50 percent, 51–75 percent, 76–95 percent, and 96–100 percent. Native species occurring within the weed polygons were noted. Photographs were also taken of each new weed polygon. Additional details on the methodology and results are provided in Appendix G.

Exotic Plant Species Distribution Results. Figure 6 shows the distribution of dominant exotic species within the Preserve. The most abundant dominant exotic species categories occurring within the Preserve are annual grasses and mustard. These dominant exotics occur throughout the historically disturbed areas of the Preserve with relatively dense cover, with the majority of polygons estimated at 51–75 percent cover for the top dominant species and 26–50 percent for the second dominant species. Milk thistle and Italian thistle are exotic species encountered frequently throughout the Preserve, generally in association with annual grasses and/or mustard. Tree tobacco is also found more often in nonnative grass-dominated polygons.

Relatively few of the smaller polygons are dominated by other exotic species, including fennel (*Foeniculum vulgare*), summer mustard (*Hirschfeldia incana*), Harding grass (*Phalaris aquatica*), wild radish (*Raphanus sativus*), red-stemmed filaree, bull thistle (*Cirsium vulgare*), tree tobacco, castor bean, and areas of eucalyptus (*Eucalyptus globulus*) and Brazilian pepper-tree (*Schinus terebinthifolius*). These polygons tend to have less dense cover overall than polygons dominated by nonnative grass or black mustard.

Figure 7 presents the acreage of the dominant exotic species from all weed polygons mapped in 2004 across all soil associations. At this level, some patterns can be observed for some of the less widely dispersed species, while the more common exotics, nonnative grass and black mustard, range across most of the soil associations. Generally, in the Preserve, black mustard is more likely to be dominant on calcareous clay and clay loam soils with nonnative grasses than the second dominant species. In areas where annual grasses dominate, the soils range from clays to loams with no apparent preference for calcareous soils. However, the second dominant species varies with more specificity for soil type; thus, when annual grasses and mustard are the top two dominant species, more than one-half of the sampled soils are clay loam soils and likely to be calcareous. When the second dominant species is other forbs, the soil is clay and generally not calcareous.

3.2.2 Existing Fuels and Fire Hazard Conditions

Droughts and high temperatures contribute to frequent wildfires in Los Angeles County; however, most of the wildfires are caused by humans. Existing fuel modification areas are located on some edges of the land managed by the Habitat Authority, although fuel load data has not yet been gathered for the Preserve (Figure 8). All of these areas are adjacent to houses or other structures. Fuel modification areas are also located along a few of the paved roads that bisect the Preserve. The current maintenance procedures for the fuel modification areas are to mow, disc, weed whip, and

hand-thin/clear the areas. Most of these procedures are labor-intensive, and the Habitat Authority incurs considerable expenses performing this work every year. These procedures also increase the edge effect on the Preserve and allow nonnative invasive weeds, rather than natives, to become established. Fuel management and long- and short-term fire management guidelines are proposed in Section 6.2.2 of this document.

3.3 GENERAL WILDLIFE

Preserve surveys conducted in 2005 and 2006 (LSA 2005a, b, c; Remington 2006) documented the presence of numerous native species: 12 dragonflies and damselflies, 38 butterflies, 4 amphibians, 9 reptiles, 124 birds, and 30 mammals. Several nonnative species were documented as well. Despite the fact that the Preserve is almost surrounded by urbanization, it supports a large suite of mammalian species, including mountain lion, bobcat, coyote, gray fox, and American badger, to name just a few. Appendix F lists all animals observed or that could potentially occur in the Puente Hills Preserve.

Many of the Preserve's wildlife species are habitat generalists that use a range of habitats. The most widespread invertebrates recorded in 2005 were the wandering (*Pantala flavescens*) and spot-winged (*Pantala hymenaea*) gliders, painted lady (*Vanessa cardui*), and the nonnative cabbage white (*Pieris rapae*). The western fence lizard, coastal western whiptail, and southern alligator lizard were the most widespread reptiles. Fourteen resident bird species were found in all 23 drainages surveyed in the Preserve: turkey vulture, red-tailed hawk, mourning dove, Anna's hummingbird (*Calypte anna*), common raven (*Corvus corax*), bushtit (*Psaltriparus minimus*), house wren (*Troglodytes aedon*), wrentit, California thrasher, spotted (*Pipilo maculatus*) and California (*Pipilo crissalis*) towhees, song sparrow (*Melospiza melodia*), house finch, and lesser goldfinch (*Carduelis psaltria*). Another eight were found in 20 or more drainages: California quail (*Callipepla californica*), Cooper's hawk, Nuttall's woodpecker, black phoebe (*Sayornis nigricans*), western scrub-jay (*Aphelocoma californica*), Bewick's wren (*Thryomanes bewickii*), northern mockingbird (*Mimus polyglottos*), and orange-crowned warbler (*Vermivora celata*). The black-headed grosbeak (*Pheucticus melanocephalus*), lazuli bunting (*Passerina amoena*), and Bullock's oriole (*Icterus bullockii*) were the most widespread summer visitors, all recorded in 18 or more drainages, while five winter visitors were recorded in 19 or more drainages: the ruby-crowned kinglet, hermit thrush, yellow-rumped warbler, and white-crowned (*Zonotrichia leucophrys*) and golden-crowned sparrows. The most widespread mammal species were the big brown bat (*Eptesicus fuscus*), Mexican free-tailed bat (*Tadarida brasiliensis*), desert cottontail, California ground squirrel, Botta's pocket gopher, California pocket mouse, western harvest mouse, deer mouse, coyote, and mule deer. The hoary bat (*Lasiurus cinereus*) is a migratory species that is most common in the Preserve in winter.

The birds of the Puente Hills have been addressed in the summary of breeding land birds of the Puente-Chino Hills prepared by Daniel S. Cooper (2000). Cooper surveyed this area in 1997 and 1998, and his summary of raptors was especially thorough.

3.3.1 Raptors

Table D conveys information pertaining to the seasonal status of raptor species at the Preserve, based primarily on Cooper's (2000) study. LSA conducted additional raptor surveys in the winter and spring

Table D: Expected Seasonal Status of Raptor Species at the Puente Hills Landfill Preserve

Observed ³	Species ⁴	Breeding	Winter	Migration
C, L, S, T	Turkey vulture (<i>Cathartes aura</i>)	Present, but probably not nesting	Present	Present
L, S	Osprey* (<i>Pandion haliaetus</i>)		Occasional	Occasional
C, L, P, S, T	White-tailed kite* (<i>Elanus leucurus</i>)	Present and nesting occasionally	Present	Present
C, L, P, S, T	Northern harrier* (<i>Circus cyaneus</i>)	Sporadic, with occasional nesting	Present	Present
L, P, S, T	Sharp-shinned hawk* (<i>Accipiter striatus</i>)		Present	Present
L, S, T	Cooper's hawk* (<i>Accipiter cooperii</i>)	Present and nesting	Present	Present
C, L, S, T	Red-shouldered hawk (<i>Buteo lineatus</i>)	Present and nesting	Present	Present
P, S	Swainson's hawk* (<i>Buteo swainsoni</i>)			Occasional
C, L, S, T	Red-tailed hawk (<i>Buteo jamaicensis</i>)	Present and nesting	Present	Present
S	Ferruginous hawk* (<i>Buteo regalis</i>)		Occasional	Occasional
	Rough-legged hawk (<i>Buteo lagopus</i>)		Occasional	Occasional
C, S	Golden eagle* (<i>Aquila chrysaetos</i>)	Occasional, but not nesting	Occasional	Occasional
C, L, T	American kestrel (<i>Falco sparverius</i>)	Present and nesting	Present	Present
L, S	Merlin* (<i>Falco columbarius</i>)		Present	Present
L, S	Peregrine falcon* (<i>Falco peregrinus</i>)	Occasional, but not nesting	Occasional	Occasional
S	Prairie falcon* (<i>Falco mexicanus</i>)		Occasional	Occasional
C, S	Barn owl (<i>Tyto alba</i>)	Present and nesting	Present	Present
C, S	Western screech-owl (<i>Otus kennicottii</i>)	Present and nesting	Present	Present
C, L, S	Great horned owl (<i>Bubo virginianus</i>)	Present and nesting	Present	Present
C	Burrowing owl* (<i>Athene cunicularia</i>)		Occasional	Occasional
	Long-eared owl* (<i>Asio otus</i>)		Occasional	Occasional
	Short-eared owl* (<i>Asio flammeus</i>)		Occasional	Occasional

³ C = Cooper 2000; L = LSA observations; P = PCR et al. 2000; S = Larry Schmahl personal communication (pers. comm. 2005); T = TerraCor 2002.

⁴ * designates a California Special Animal; Consult Appendix I, which lists sensitive species within the Preserve, for additional information.

of 2005. General information pertaining to raptors found within the Preserve is provided below, with a more detailed description of each raptor species occurring in Appendix H.

Grassland is the most important habitat for raptors in the Preserve. Although few of them nest there, all of the species listed in Table D forage in grasslands, with the exception of the osprey (*Pandion haliaetus*) and western screech-owl (*Otus kennicottii*). In the Preserve, the northern harrier (*Circus cyaneus*), burrowing owl (*Athene cunicularia*), and several of the rare species nest in grasslands and are not typically expected to be found in any other habitat. (Three burrowing owls were spotted in October and November 2006 in Arroyo San Miguel on the edge of an existing coastal sage scrub restoration site.)

Coastal sage scrub and chaparral are used for foraging by most of the Preserve's raptors, especially the more open areas at the coastal sage scrub/grassland ecotone, but none of the species is expected to nest there. The trees present in riparian and woodland habitats are essential to many species for nesting and roosting. In the Preserve, the white-tailed kite, Cooper's hawk, red-shouldered hawk, red-tailed hawk, American kestrel, barn owl (*Tyto alba*), western screech-owl, and great horned owl are almost entirely dependent on trees for nesting. Red-tailed hawks, barn owls, and great horned owls will also nest on cliffs; barn owls and American kestrels also nest on buildings and other structures. The western screech-owl exclusively forages in these habitats, and the sharp-shinned (*Accipiter striatus*), Cooper's, and red-shouldered hawks primarily forage there.

Structurally, the canopies of eucalyptus and other ornamental trees mimic natural habits in the Preserve. Where ornamental trees approximate the preferred habitat for certain species, there may be considerable use by raptors. The raptor species in the Preserve that are most frequently associated with disturbed areas are Cooper's hawk and red-shouldered hawk.

3.3.2 Bats

State and federal land management agencies officially recognize over two-thirds of the south coast ecoregion's 24 bat species as sensitive. Bats are among the hardest vertebrate species to detect, but surveys conducted in the Preserve in 2004 and 2005–2006 (Remington 2006) confirmed the presence of 11 species. Six of these species are considered to be California Species of Special Concern (CSC) by the California Department of Fish and Game (CDFG) or are included on CDFG's list of Special Animals of California (CSA). Appendix I summarizes the status of sensitive bat species known to occur or potentially occur in the Preserve.

Of the locations surveyed, Sycamore Canyon and Turnbull Canyon had the highest species richness—with at least eight species each—and the highest activity levels, including apparent roosting. Those were the only sites surveyed that had substantial amounts of sycamore riparian habitat. Seven species were recorded in oak-rich Powder Canyon, but activity levels there were surprisingly low. Activity levels were highest in spring and summer, but some bats were active throughout the year.

Four species accounted for most of the bat detections. The Mexican free-tailed bat was recorded at 10 of 12 survey sites and in 10 of 12 survey months. This species was especially common in summer. The western pipistrelle (*Pipistrellus hesperus*) was detected in 11 of 12 months, but only in Sycamore and Turnbull Canyons, where their preferred rocky outcrops were available. Western red bats (CSA) and hoary bats (CSA) were each detected in 10 of 12 months and at 6 of 12 sites. They were

found primarily in heavily vegetated areas. Unlike the other species, the hoary bat is most often encountered in winter in lowland southwestern California.

The big brown bat (7 sites, 6 months; but especially common in summer) and western yellow bat (CSA; 5 sites, 5 months; primarily a palm specialist) were the next most widespread species, followed by pocketed free-tailed bat (CSC, *Nyctinemops femorossacus*; 3 sites, 4 months), Yuma myotis (CSA, *Myotis yumanensis*; 3 sites, 2 months), and western mastiff bat (CSC, *Eumops perotis californicus*; 1 site and 1 month only; a wide-ranging, high-flying species). Two species were confirmed only in the 2004 survey: the California myotis (*Myotis californicus*) and pallid bat (CSC, *Antrozous pallidus*).

3.4 WILDLIFE MOVEMENT CORRIDOR AND HABITAT FRAGMENTATION

Increased development surrounding and within the Puente-Chino Hills, including those areas adjacent to the Preserve, has increasingly fragmented the area, resulting in isolated islands of habitat. By reducing the movement of wildlife and plant seeds, the risk of local extinctions is increased. Habitat fragmentation consequently threatens the viability of these remaining natural resources. Large areas of habitat or narrower linkages of habitat between expanses of open space (i.e., biocorridors) are necessary to provide movement opportunities for wildlife. Movement serves to facilitate the geographic distribution of genetic material, thus maintaining a level of variability in the gene pool of an animal population. Influxes of animals from nearby larger populations contribute to the genetic diversity of a local population, helping to ensure the population's ability to adapt to changing environmental conditions. Many plant species that depend on relatively sedentary insects for pollination also benefit from habitat linkages that allow for genetic exchange and dispersal. Reduced insect movement due to habitat fragmentation results in reduced genetic vigor in those plants. Likewise, plant seeds and propagules can be transported via the feces, fur, or feathers of birds or mammals.

The Puente-Chino Hills Wildlife Corridor extends approximately 31 miles south from the San Gabriel River to the Cleveland National Forest in the Santa Ana Mountains. The Conservation Biology Institute's (CBI) recent report, *Maintaining Ecological Connectivity Across the "Missing Middle" of the Puente-Chino Hills Wildlife Corridor*, included the corridor map shown in Figure 9.

The fact that the Preserve supports one of the most studied wildlife corridors in North America demonstrates its tremendous significance in the densely urbanized Los Angeles Basin, where open space is very limited (CBI 2005). Even though a considerable amount of habitat fragmentation has occurred in the hills, the largest remaining carnivore in the region (the mountain lion) is still known to use the Coal Canyon corridor that connects the Santa Ana Mountains to Chino Hills State Park and occasionally visit. (Beier 1995). However, encroaching development and roads that bisect the corridor impede wildlife movement and increase wildlife mortality as animals risk roadway crossings.

A 2005 study conducted by CBI concluded that a large proposed development east of the Preserve could present the biggest threat to the functionality of the Puente-Chino Hills Wildlife Corridor because it could potentially cut off the habitat west of Chino Hills State Park, thus rendering this western portion of the corridor nonfunctional. Unconstrained development within the Corridor has the potential to seriously alter the functionality of the ecosystem within the Puente/Chino Hills.

Within the Puente Hills, Haas (2000) and Haas et al. (2002) studied wildlife movement among patches of natural habitat. Four roads crossing the Preserve were identified as potential barriers to wildlife movement: Harbor Boulevard, Hacienda Boulevard, Colima Road, and Turnbull Canyon Road. In summer 2006, a wildlife tunnel was constructed under the heavily traveled Harbor Boulevard to better allow for the safe crossing of coyote, deer, and bobcat into and out of Powder Canyon. The fencing, needed to direct wildlife into the tunnel, has not yet been negotiated on the private property east of Harbor Blvd owned by Shell-Aera (CBI 2005). Steep slopes and adjacent housing limit the possibilities for wildlife crossing Hacienda Boulevard, on the western side of Powder Canyon, resulting in a bottleneck to movement. The four-lane Colima Road, on the other hand, provides numerous opportunities for crossing, yet is associated with high coyote roadkill. The Colima Service Tunnel, which runs under the road, is used by coyotes, bobcats, and deer, as well as humans and dogs. Wildlife species use the tunnel between sunset and sunrise (Haas et al. 2002).

Turnbull Canyon Road, snaking through the Whittier Hills, is the most permeable road in the Preserve, as its light traffic volumes and passage through fairly undisturbed habitat allow for the relatively safe crossing of deer, bobcats, and mountain lions (CBI 2005). Strategies for improving the functionality of the corridors within the Preserve are presented in Section 6.6.4.

3.5 THREATENED, RARE, OR ENDANGERED SPECIES

Legal protection of sensitive species varies widely, from the relatively comprehensive protection afforded to species listed as endangered and/or threatened to no legal status at present. The CDFG, United States Fish and Wildlife Service (USFWS), local agencies, and various special interest groups (e.g., California Native Plant Society [CNPS]) publish watchlists of declining species. These lists often describe the nature and perceived severity of the species' decline. Species that are clearly not rare or threatened either statewide or regionally, but whose local populations are sparse, rapidly dwindling, or otherwise unstable, may be "of local interest."

For purposes of this discussion, the term "sensitive species" refers to those plants and animals occurring, or potentially occurring, on the property and designated as endangered or rare by federal or State agencies, or of current local, regional, or State concern. These are species that are rare, locally restricted, or declining in a significant portion of their range. Inclusion in the sensitive species analysis for this property is based on the following criteria: (1) direct observation of the species on the property during one of the biological surveys conducted for this report; (2) sighting by other qualified and reputable observers; (3) record reported by the California Natural Diversity Data Base (CNDDB); or (4) property contains appropriate habitat and is within the known range of a given species. Appendix I summarizes the status of sensitive species known to occur or potentially occur in the Preserve. Plant communities/habitats of concern are considered separately below. The Preserve serves a vital role in the conservation of these species and habitats in southwestern California. Preservation of large blocks of open space increases the probability that the populations of these species will remain relatively stable and that more drastic conservation measures will not be necessary.

3.5.1 Sensitive Plant Species

Focused sensitive plant surveys were conducted within Turnbull Canyon in 2000 and throughout the Preserve in 2005 (LSA 2000, 2006). The Preserve supports several sensitive plant species (Table E).

Table E: Rare Plants in the Preserve

Species	Habitat and Distribution	Activity/Blooming Period	Status Designation ⁵	Probability of Occurrence ⁶
LISTED SPECIES				
Braunton's milkvetch <i>Astragalus brauntonii</i>	Occurs in recently burned or otherwise disturbed soil areas (e.g., firebreaks) below 1,500 ft elevation in portions of Ventura, Los Angeles, and Orange Counties. Often found in limestone deposits, marine terraces, and other calcareous soils in association with chaparral, coastal sage scrub, and other brushy places.	February–June	Fed.: FE State: --- CNPS: 1B	Moderate to High. Perennial herb. PCR documented a high potential of occurring within Preserve where suitable habitat exists. However, LSA has not observed this species during previous surveys.
Thread-leaved brodiaea <i>Brodiaea filifolia</i>	Clay soils, usually associated with annual grassland; vernal pools often surrounded by shrubland habitat.	March–June	Fed.: FT State: CE CNPS: 1B	Low to Moderate. Potential of occurring within the Preserve where habitat exists per PCR document. However, LSA has not observed this species during previous surveys.
California Orcutt grass <i>Orcuttia californica</i>	Vernal pools in Ventura, Riverside, and San Diego Counties, Baja California; known from fewer than 20 locations; below 2,000 ft elevation.	April–June	Fed.: FE State: CE CNPS: 1B	Low. Habitat appears unsuitable. LSA has not observed during previous surveys.
UNLISTED SPECIES				
Coulter's saltbush <i>Atriplex coulteri</i>	Occurrence in Chino-Puente Hills region poorly known. Historical record for Chino Creek. Alkaline or clay soils in coastal sage scrub or valley and foothill grassland.	March–October	Fed.: --- State: --- CNPS: 1B	Low. No suitable habitat noted within the Preserve.
Catalina mariposa lily <i>Calochortus catalinae</i>	Heavy soil, on open grassy slopes and openings in brush, below 2,000 ft elevation in chaparral, coastal sage scrub, valley, and foothill grassland. San Diego County to San Luis Obispo County; Santa Catalina, Santa Cruz, and Santa Rosa Islands.	February–May	Fed.: --- State: --- CNPS: 4	Observed. Observed by LSA in spring 2000 and 2005 within Turnbull Canyon parcel.
Plummer's mariposa lily <i>Calochortus plummerae</i>	Dry, rocky places, often in brush, below 5,000 ft elevation. Usually on granitic soils. Found in grassland chaparral, coastal sage scrub, yellow pine forest. Santa Monica Mountains to San Jacinto Mountains. Riverside, San Bernardino, Los Angeles, and Ventura Counties.	May–July	Fed.: --- State: --- CNPS: 1B	Observed. Observed by LSA in spring 2000 and 2005 within Turnbull Canyon parcel.
Intermediate mariposa lily <i>Calochortus weedii</i> var. <i>intermedius</i>	Dry, rocky, open slopes, often in chaparral, coastal sage scrub, valley, and foothill grassland below 2,000 ft elevation. Los Angeles, Orange, and Riverside Counties.	May–July	Fed.: --- State: --- CNPS: 1B	Moderate. LSA documented suitable habitat present within the Preserve boundaries. LSA has not observed during previous surveys.
False Payson's jewel flower <i>Caulanthus heterophyllus</i> var. <i>pseudosimulans</i>	Occurs on xeric, granite slopes in coastal sage scrub or chaparral	March–May	Fed.: --- State: CSC CNPS: Local concern	Low-Moderate. Not recorded in Puente Hills, but expected to occur in the Preserve.

⁵ For a description of status designations, see Legend on last page.

⁶ Based on the following categories: Absent, Low, Moderate, High, and Observed.

Table E: Rare Plants in the Preserve

Species	Habitat and Distribution	Activity/Blooming Period	Status Designation ⁵	Probability of Occurrence ⁶
Southern tarplant <i>Centromadia parryi</i> ssp. <i>australis</i>	Occurs in alkali meadows, grasslands, and riparian herb habitats. Historically occurred in much of Los Angeles basin.	May–November	Fed: --- State: --- CNPS: 1B	Low to Moderate. Suitable habitat questionable within the Preserve. LSA has not observed this species during previous surveys.
Many-stemmed dudleya <i>Dudleya multicaulis</i>	Often on clay soils and around granitic outcrops in chaparral, coastal sage scrub, and grasslands; below 2,500 ft elevation. Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties.	May–July	Fed.: --- State: --- CNPS: 1B	Observed. Documented in the checklist of vascular plants of Whittier Hills, LA County. LSA has not observed this species during previous surveys.
Mesa Horkelia <i>Horkelia cuneata</i> ssp. <i>puberula</i>	Sandy or gravelly substrates with chaparral, cismontane woodland coastal scrub. Typically more inland than other subspecies, from San Diego County to Central California.	February–September	Fed: --- State: --- CNPS: 1B	Low. Not observed within Preserve boundaries; not documented as potentially occurring within Preserve vicinity. LSA has not observed this species during previous surveys.
Southern California black walnut <i>Juglans californica</i> var. <i>californica</i>	Occurs in grasslands, floodplains, and woodland habitats. The Chino–Puente Hills is a major center of distribution for this species.	March–May	Fed: --- State: --- CNPS: 4	Observed by Bon Terra (2004).
Coulter’s goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	Marshes, playas, vernal pools, grassland; sea level to 3,000 ft elevation. Inland Southern California and along coast from San Luis Obispo County to Baja California.	February–June	Fed: --- State: --- CNPS: 1B	Moderate. LSA has not observed this species during previous surveys.
Robinson’s pepper grass <i>Lepidium virginicum</i> var. <i>robinsonii</i>	Dry soils in coastal sage scrub and chaparral; typically below 1,500 ft elevation; southwestern California and Baja California.	January–July	Fed: --- State: --- CNPS: 1B	Observed. Observed by LSA in spring 2000 within Turnbull Canyon parcel.
Orutt’s linanthus <i>Linanthus orcuttii</i>	Chaparral, lower montane coniferous forest. Sometimes in disturbed areas, often in gravelly clearings; 1,060–2,000 m; Orange, Riverside and San Diego Counties into Baja California.	May–June	Fed: --- State: --- CNPS: 1B	Low. Not observed within Preserve boundaries, not documented as potentially occurring within the Preserve vicinity. LSA has not observed this species during previous surveys.
Small-flowered microseris <i>Microseris douglasii</i> var. <i>platycarpa</i>	Found in claysoils. Recorded from Chino Hills in the Diamond Ranch area.	March–May	Fed: --- State: --- CNPS: 4	Low-Moderate. Habitat appears suitable. LSA has not observed this species during previous surveys.
Prostrate navarretia <i>Navarretia prostrata</i>	Alkaline soils in grassland or in vernal pools. Los Angeles and western San Bernardino Counties to Monterey County.	April–July	Fed: --- State: --- CNPS: 1B	Low. Not observed within Preserve boundaries; not documented as potentially occurring within the Preserve vicinity. LSA has not observed this species during previous surveys.

Table E: Rare Plants in the Preserve

Species	Habitat and Distribution	Activity/Blooming Period	Status Designation ⁵	Probability of Occurrence ⁶
Golden-rayed pentachaeta <i>Pentachaeta aurea</i>	Occurs in grassland and coastal sage scrub. Recorded from the Santa Monica Mountains and Orange County.	March–July	Fed: --- State: --- CNPS: 4	Moderate. Although not recorded from the Preserve, it is poorly documented, and habitat on site appears suitable. LSA has not observed this species during previous surveys.
Brand’s phacelia <i>Phacelia stellaris</i>	Open areas within coastal scrub, typically below 4,500 ft.	March–June	Fed: --- State: --- CNPS: 1B	Moderate. LSA documented that suitable habitat is present within the Preserve boundaries. LSA has not observed this species during previous surveys.
Parish’s gooseberry <i>Ribes divercatum</i> var. <i>parishii</i>	Riparian woodlands. This plant is known from Los Angeles and San Bernardino Counties and is thought to be extinct.	Deciduous shrub; blooms February–April	Fed: --- State: --- CNPS: 1B	Low. Not observed within the Preserve boundaries; not documented as potentially occurring within the Preserve vicinity. The last known occurrence of this species was in San Bernardino County in 1917. LSA has not observed this species during previous surveys.
Coulter’s matilija poppy <i>Romneya coulteri</i>	Occurs in alluvial fan sagescrub, sycamore woodland coastal sage scrub, and chaparral.	March–July	Fed: --- State: --- CNPS: 4	Observed by Bon Terra on Whittier College parcel (2004). However, not known if this is a native occurrence.
Southern skullcap <i>Scutellaria bolanderi</i> ssp. <i>austromontana</i>	Gravelly soils and streambeds in chaparral, woodland and coniferous forests; 1,000–6,000 ft elevation. Known from Riverside and San Diego Counties; extirpated from San Bernardino County; status unknown in Los Angeles County.	June–August	Fed: --- State: --- CNPS: 1B	Low. Not observed within Preserve boundaries; not documented as potentially occurring within the Preserve vicinity. Only source of information for this occurrence is site name noted by Jepson in “A Flora of California” (1943). Identification of this occurrence is questionable. LSA has not observed this species during previous surveys.

Legend: Status Designation

FEDERAL STATUS

- FE Federally listed as Endangered.
- FT Federally listed as Threatened.

STATE STATUS

- CE State listed as Endangered.

CNPS LISTING

- 1A List of plants that are presumed extinct in California.
- 1B List of plants that are considered by the CNPS to be Rare, Threatened, or Endangered in California and elsewhere.
- 2 List of plants that are considered by CNPS to be Rare, Threatened, or Endangered in California, but more common elsewhere.
- 3 CNPS review list of plants suggested for consideration as Endangered but about which more information is needed.
- 4 CNPS watch list of plants of limited distribution, whose status should be monitored.

Sensitive plant species were assessed based on the CNPS classification criteria. Table E, with data excerpted from Appendix I (Sensitive Species Table), describes the ranking attributed to the plant species in the discussion below.

Stands of Southern California black walnut, a CNPS List 4 (Watch List) species, occur in Powder Canyon and between Puma and Toyon Canyons in the Hacienda Hills area. In addition, the Preserve supports Coulter's matilija poppy (*Romneya coulteri*), a CNPS List 4 species, and Plummer's mariposa lily (*Calochortus plummerae*), a CNPS 1B (Rare, Threatened, or Endangered) species. Coulter's matilija poppy can occur in a variety of habitats, including alluvial fan sage scrub, sycamore woodland coastal sage scrub, and chaparral. Within the Preserve, this species is known from a slope of Whittier College just outside of the Preserve limits. However, it is not known if this occurrence is a native occurrence or if it was planted as landscaping. Plummer's mariposa lily is found in coastal sage scrub and chaparral habitats. This species was historically documented within the Preserve and identified within Toyon Canyon (BonTerra) and within Turnbull Canyon in 2000 (LSA 2000). The 2005 survey documented 34 new occurrences, primarily in the northern portion of the Preserve, with abundances ranging from 1 to 100 individuals (LSA 2006).

Two sensitive species occur in Turnbull Canyon: Catalina mariposa lily (*Calochortus catalinae*) (CNPS List 4) and Robinson's peppergrass (*Lepidium virginicum* var. *robinsonii*) (CNPS List 4). Catalina mariposa lily was identified within an area of needlegrass grassland, and Robinson's peppergrass was identified in an area of nonnative annual grassland in the northwestern portion of Turnbull Canyon.

In addition, two endangered species occur in the region: Braunton's milkvetch (*Astragalus brauntonii*) and California orcutt grass (*Orcuttia californica*). Braunton's milkvetch is found on carbonate soils associated with a variety of habitats, including coastal sage scrub, chaparral, and grasslands. This species typically flourishes in the first years after fires and/or site disturbances and can therefore be extremely difficult to detect. California orcutt grass occurs in vernal pools in valley grassland below 2,000 ft in elevation. However, because neither of these species was observed in the Turnbull Canyon area, and because vernal pools are not known to exist within the Preserve, focused surveys outside of the Preserve area are recommended to determine the presence of either species or previously unidentified vernal pools.

3.5.2 Sensitive Wildlife Species

At least 30 sensitive species have been recorded on the Preserve (Appendix I). The federally threatened coastal California gnatcatcher is one listed bird species that is known to be a resident in the Preserve. In 2005, at least three gnatcatcher pairs were present in the restoration area east of Colima Road and one pair was found in lower Sycamore Canyon; scattered single birds observed late in the season are best considered wandering juveniles (LSA 2005a). Gnatcatchers are most often found in coastal sage scrub habitat, as are other sensitive species such as the cactus wren, Southern California rufous-crowned sparrow, and San Diego desert woodrat.

Other listed species recorded in the Preserve include the wide-ranging peregrine falcon (*Falco peregrinus*) and the least Bell's vireo. The vireo is a riparian specialist that was recorded in Sycamore Canyon in 2005 (LSA 2005c) and may nest in the Preserve occasionally. Other sensitive species primarily using riparian habitats include the western red (*Lasiurus blossevillii*) and hoary bats,

California yellow warbler (*Dendroica petechia brewsteri*), and yellow-breasted chat. The State listed willow flycatcher (*Empidonax traillii*) migrates through the Preserve, with the federally listed subspecies *extimus* (i.e., southwestern willow flycatcher) nesting in extensive bottomland habitat only 15 miles to the east in the Prado Basin.

Grasslands are the preferred habitat for sensitive species such as the western spadefoot, white-tailed kite, northern harrier, loggerhead shrike, and California horned lark, but most of the nonlisted sensitive species of the Preserve are found in a range of habitats. Reptiles such as the coastal western whiptail and northern red-diamond rattlesnake are most common in chaparral and coastal sage scrub, but also range into grassland, riparian, and woodland. Raptors are generally associated with grasslands, but most (e.g., the white-tailed kite) require woodlands for nesting. Other raptors such as Cooper's hawk are most closely associated with woodlands, but also forage in all other habitats. Some bat species have restrictive roosting needs but forage over large areas. A number of sensitive bat species potentially occur in the Preserve; most are confined to woodlands, cliffs, or structures for roosting, but range more widely when foraging (Section 3.3.2).

3.5.3 Sensitive Habitats

Habitats are considered to be sensitive biological resources based on (1) federal, State, or local laws regulating their development; (2) limited distributions; and/or (3) the habitat requirements of sensitive plants or animals occurring on site. Biologists identified five primary plant communities considered sensitive by State and/or local agencies; these communities occur with varied abundance and in ecotones or mixtures of various other habitat types on site. Regardless of the mixture, or ecotone, these habitats are considered sensitive. In addition, wetlands and waters of the United States are considered sensitive by both federal and State agencies. Each sensitive habitat identified in the Preserve is described in more detail below.

Coastal Sage Scrub. Coastal sage scrub and its various subtypes as listed in Table B have been displaced by spreading urbanization. Therefore, these habitat types are considered sensitive by the CDFG and the USFWS. In addition, many rare or endangered species occur in coastal sage scrub and associated plant communities. Degradation and displacement of coastal sage scrub has resulted in substantial habitat loss for a variety of animal species, particularly birds such as the coastal California gnatcatcher.

Coast Live Oak Woodland. Oak trees are among the most characteristic plants associated with California, and they enjoy great admiration and protection throughout the State. This habitat type includes sycamore riparian woodland/oak riparian forest, coast live oak riparian forest/sycamore riparian woodland, coast live oak woodland/walnut woodland, coast live oak/ornamental plantings, and coast live oak riparian forest. These habitats provide high wildlife habitat values and are considered sensitive by the CDFG.

Willow Riparian. Willow riparian habitats such as southern willow scrub were formerly abundant along major rivers of coastal Southern California but are now much reduced by urban expansion, flood control, and channel "improvements" (Holland 1986). These habitats are considered high-

quality wildlife habitats because they provide protective cover, water, and food for a variety of species. Many animal species, including a number of sensitive ones, are riparian habitat obligates and large mammals that require access to water and use the band of riparian habitat as a wildlife corridor.

Southern Sycamore Riparian Woodland. This habitat, including sycamore riparian woodland/oak riparian forest and coast live oak riparian forest/sycamore riparian woodland, shares many of the same positive values as the previous two habitats and is also considered rare by the CDFG. These communities typically occur along very large streambeds that are subject to seasonal high-intensity flooding (Holland 1986).

Needlegrass Grassland. The CDFG has designated needlegrass grassland as a sensitive natural community based on its rarity. Purple needlegrass is significant because it is a key component of the few remaining pockets of California native grassland. Originally, grassland probably covered well-drained areas in California from sea level to approximately 3,600 ft in elevation (Barbour and Major 1990). Grasslands ringed the Central Valley and were dotted along the coast. Purple needlegrass is thought to have been the dominant grass of pristine valley grasslands (Barbour and Major 1990). Since then, nonnative annual grasses and forbs have come to dominate California's grasslands.

Grassland disturbance occurred in two major waves. The first wave occurred approximately 200 years ago when Europeans introduced livestock grazing to the region. The introduction of cattle, and the associated introduction of European annual grasses as forage, forever altered the grassland landscape. These native ecosystems have been replaced by Mediterranean annual grasslands, more suited to extended grazing by cattle (Barbour and Major 1990). The second wave of grassland disturbance occurred during the past century with the introduction of aggressive exotic pest plants such as Italian thistle. Improper grassland management and/or lack of management have almost certainly contributed to the continued spread of these weeds in many locations in California. As is the case throughout coastal California, nonnative species have become dominant in many grasslands in the Preserve.

Riparian Herb. This habitat type, often resembling grasslands, is seasonally flooded by freshwater and is dominated by persistent hydrophytic vegetation. This habitat is considered sensitive, as it is much reduced over its entire range.

Walnut Woodland. California walnut forests and woodlands, including coast live oak woodland/walnut woodland ecotone, have a limited distribution within their small range and are found only in coastal Southern California. As all walnut stands are within or near urban areas, rapid expansion of the metropolitan Southern California area is further reducing the limited extent of these communities.

4.0 CULTURAL RESOURCES

The goals of Cultural Resources Management in California are summarized in the Office of Historic Preservation's (OHP) document *Forging a Future with a Past, a Comprehensive Statewide Historic Preservation Plan for California* (1997). Southern California and Los Angeles County are characterized by a rich historical past that is represented by the contributions and collective human experiences of a diversified population spanning 10,000–12,000 years of occupancy. This heritage is embodied in the archaeological remains, historical buildings, traditional customs, documents, and public records that contribute to the sum of the area's history. Such historical resources provide continuity with the past, shape the culture, and enhance quality of life. Thus, the goal for the preservation of historic resources is to avoid any adverse impacts on these resources. Preservation also provides the opportunity for continued cultural uses of the archaeological sites by the descendants of those who once lived there, provides scientists with contextual data relevant to the site, encourages an interdisciplinary approach, and creates opportunities for on-site public education and interpretation.

LSA performed a cultural resources assessment to document and evaluate historical resources as part of the RMP. The objective of this evaluation is to allow for the best management and protection of cultural resources within the Preserve. This study included conducting records searches, field surveys, and summarizing the findings in the existing conditions section of this RMP. The goal of the study was to identify significant resources that may be affected by an undertaking within the Preserve; to assess project impacts on those resources; and to develop management guidelines to avoid, offset, or eliminate adverse impacts. These guidelines are included in the management portion of this document (Section 6.3). The records research indicated that 12 historic properties have been recorded within 0.5 mile of the Habitat Authority jurisdiction boundary, but that no cultural or paleontological resources were recorded within the Preserve itself.

4.1 ETHNOGRAPHIC

Of special cultural significance to the history of the Preserve is the ethnographic group of Native Americans who occupied the Puente Hills and whose artifacts potentially remain. Ethnographic studies show that the general Preserve vicinity was occupied by a Uto-Aztecan-speaking Native American group known as the Gabrielino during the 16th–19th centuries (McCawley 1996). The term *Gabrielino* is derived from the association of these Indian peoples with Mission San Gabriel. Today, some of the Gabrielino prefer to call themselves *Tongva* (McCawley 1996). The following paragraphs briefly summarize aspects of the Gabrielino cultures.

The Gabrielino Indians practiced a hunter-gatherer lifestyle and lived in permanent communities near the convergence of two or more environmental zones or habitats (Bean and Smith 1978). Commonly chosen sites included areas near rivers, streams, and inland watercourses, sheltered coastal bays and estuaries, and the transition zone delineating prairies and foothills. Important considerations influencing the location of habitation sites included some measure of protection from flooding and the presence of a stable food supply that included acorns, seeds, and other plant foods; fish and shellfish;

sea lions; deer; and small game (Hudson 1971). Gabrielino territory included the watersheds of the Los Angeles, San Gabriel, and Santa Ana Rivers; the watersheds of several smaller intermittent streams in the Santa Monica and Santa Ana Mountains; the coast from Aliso Creek north to a point between Topanga and Malibu Creeks; and the islands of San Clemente, San Nicolas, and Santa Catalina (Bean and Smith 1978:538; McCawley 1996:3).

Community populations generally ranged from 50 to 150 inhabitants, although larger settlements may have existed. A large town or capital of the Tongva was called the Ahwingna village and was located in the Hacienda Heights area. The Ahwinga village of the Tongva may have served as the provincial “capital” for several Gabrielino communities. Ahwinga means “quemada (burned brush)” (McCawley 1996). One or more lineages, each of which was composed of several related nuclear families, lived in a typical Gabrielino community. Descent among these lineages was patrilineal, and membership in a lineage provided access to land owned by that lineage. Each community had a chief, the *tomyaar*, who was the head of the oldest or largest lineage. The chief had the responsibility for ensuring that members of the community could obtain access to scarce resources in times of need. For example, the chief controlled ritual exchanges of shell beads; such exchanges maintained relationships with groups in other areas and thus provided access to resources in those areas. The chief also managed surpluses to provide insurance against tough times. In general, status differences among the Gabrielino were ascribed. Wealth was inherited, and Gabrielino society consisted of a number of classes, including elites, commoners, and slaves.

Gabrielino culture was characterized by an active and elaborate system of rituals and ceremonies. Rituals included individual rites of passage, village rites, seasonal ceremonies, and participation in the widespread Chinigchinich religion, which was observed and recorded by Franciscan Friar Geronimo Boscana during his residences at Missions San Juan Capistrano and San Luis Rey (Harrington 1933; Boscana 1933). The Gabrielino had introduced Chinigchinich, their pre-Christian creator-god, to other Indian cultures of Southern California, and the worship of this supernatural being remained a prominent religion in the region long after the introduction of Christianity (McCawley 1996).

The first documented mainland contact between the Gabrielino and Europeans occurred in 1769, when an expedition led by Gaspar de Portola crossed present-day Los Angeles and Orange Counties (W. Bean 1968:36–38; Bolton 1927). The purpose of the expedition was to find a trail to the known port of Monterey in order to establish the second of Alta California’s missions (Cleland 1962:xi). The trail the expedition used was originally a series of paths used by natives in various regions. Today, this trail, running between missions of Alta California, is known as El Camino Real, the “Kings Road.”

As the Portola party journeyed north from San Diego to Monterey, their travels involved passage through the Puente Hills. The name *Puente*, which means bridge, was derived from the Portola expedition, which camped at San Jose Creek on July 30, 1769. In order to cross the arroyo, it was necessary for the company to make a bridge of poles. On the return journey, on January 17, 1770, the company camped at the same place, noting it as *Llano de la Puente*. The name *La Habra*, which means ‘pass through the mountains,’ was given by Portola’s expedition to the pass through the Puente Hills, which they traversed on their 1769 visit (Gudde 1969:170, 258). The following paragraphs are adapted primarily from Hoover et al. (1962:11) except where referenced.

In 1771, the Mission San Gabriel Archangel was founded along the San Gabriel River near Whittier Narrows; it was the fourth of California's 21 missions (Hoover et al. 1962:12; McCawley 1996:189). In 1776, five years after its founding, the old Whittier Narrows site was abandoned due to flooding. A new mission was built on higher land in the City of San Gabriel, approximately 5 miles north of the original site (Engelhardt 1922). The Franciscans' goal in founding the missions was to convert the Indians to the Spanish Catholic faith and incorporate them into the lower strata of Spanish society. However, this conversion ultimately led to the destruction of the Gabrielino culture and society as new customs were adopted and European diseases—for which the Gabrielino had no immunities—spread. As a result, most of the traditional Gabrielino communities were depopulated, and the survivors became assimilated into the Mexican-American communities of Los Angeles and Orange Counties.

Juan Bautista de Anza was a renowned explorer who, like Gaspar de Portola, blazed his own trail into Alta California. In order for the Spanish to protect their territory in Alta California and secure it from Russian and English incursions, a route was established to provide reliable over land access. Anza recognized the potential for such a route and proved that it was possible by conducting his own exploratory trip. Anza's journey began in 1774 from Tubac Presidio in southern Arizona. Upon return in the following year, Anza and a group of colonists traveled from 1775 and 1776. The settlers eventually built the mission and founded the Presidio of San Francisco Horcasitas Sinaloa in Sonora, Mexico. Anza can be credited for successfully opening an emigration and supply route from Sonora to the missions and settlements of Alta California (National Park Service San Juan Bautista de Anza National Historic Trail Web site).

In the vicinity of the Puente Hills, the trail parallels I-10 to the San Gabriel Mission, extending east to west through the flatlands north of the hills in the San Gabriel Valley. The significance of this trail for populating California is such that the National Park Service has designated it a National Historic Trail. As the goal of the Park Service is to have a trail accessible by foot, bicycle, and horse traffic throughout Los Angeles County (Meredith Kaplan, National Park Service, verbal communication), the commemorative branch of the trail is planned to be signed through the Puente Hills Preserve. This branch essentially follows the existing Schabarum (Skyline) Trail and may contain overlooks and signs showing the original De Anza Trail route.

4.2 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

The archaeological resources assessment consisted of a records search and field survey (September 21 to September 27, 2004) component. The records search was conducted at the South Central Coastal Information Center (SCCIC), located at California State University, Fullerton. This included a review of all recorded historic and prehistoric archaeological sites, as well as a review of known cultural resource survey and excavation reports within a 0.5-mile radius of the Habitat Authority jurisdiction boundary. In addition, the SCCIC examined the National Register of Historic Places (National Register) and documents and inventories from the California OHP, including the lists of California Historical Landmarks, California Points of Historical Interest, listing of National Register Properties, and the Inventory of Historic Structures. The Historical Landmarks of Los Angeles County was also consulted, as was the Whittier Museum. A detailed summary of the methodology and results is included in Appendix J.

As mentioned previously, the results of the records search indicate that there are 12 archaeological resources recorded within 0.5 mile of the Habitat Authority jurisdiction boundary, although no cultural resources have been recorded within the Preserve itself. No properties are listed on the National Register, California Register of Historical Resources (California Register), California Historical Landmarks, California Points of Historical Interest, or Historic Properties Directory within 0.5 mile of the circuit. Twenty-five cultural resource surveys and/or reports have been completed within 0.5 mile of the Habitat Authority jurisdiction boundary.

During the course of the field survey conducted by consulting archaeologists, nine historic cultural resources determined to be over 50 years old and two isolated prehistoric cultural resources were discovered. These resources were assigned temporary numbers and are described briefly below. A more thorough description of each is found in Appendix J.

- **19-003342:** Concrete structure measuring 8.5 x 8.5 x 12 ft, located in Sycamore Canyon. The structure is composed of poured concrete, with 6-inch-wide plank molding patterns visible on all surfaces. The origin or use of this structure is unknown, but given the plank molding patterns, it may date to as early as the second decade of the 20th century. It may be associated with the Sycamore Canyon quarry, which is documented as being in the canyon beginning in 1912 (The Whittier News Annual Edition 1923).
- **19-186935:** Water-storage feature/reservoir, located approximately 400 ft northeast of Turnbull Canyon Road on the south side of the fire road. The feature is constructed of rock and mortar, measures approximately 150 ft in diameter, and is 9 ft high. The feature is of unknown origin or construction date.
- **19-186936:** 1937 Azimuth Mark, United States Coast & Geodetic Survey; brass knob mounted in cement. It also says, "For information write to the Director Washington D.C. \$250.00 or imprisonment for disturbing this mark."
- **19-186937:** Sycamore Canyon House. This house is a modified T-shape wood frame clad in stucco. Original construction is thought to have occurred sometime during the 1930s (verbal communication, Habitat Authority 2004).
- **19-186938:** Sycamore Canyon Apartment. The apartment is a two-story building with a rectangular mass clad in stucco. Construction is thought to have occurred sometime during the 1930s (verbal communication, Habitat Authority 2004).
- **19-186939:** Storage Facility. The building is a rectangular mass made of reinforced concrete and sits on a concrete pad. Construction is thought to have occurred sometime during the 1930s (verbal communication, Habitat Authority 2004).
- **19-003341:** Historic Whittier Oil Field. The Whittier Oil Field is located on the southern slope of the Puente Hills immediately east of the City of Whittier. The area included approximately 485 acres of oil-productive geologic formations (Bradley 1943). Oil production began circa (ca) 1885 and continued to be a viable economic force in the area through the 1940s. Cumulative oil production from September 1919 to 1941 was estimated at 1.567 million barrels (Bradley 1943). Oil production slowed substantially by the 1950s. The wells of the Whittier Oil Field have been dismantled; however, significant ancillary features such as roads, markers, and well pads remain.
- **19-003345:** Historic farm equipment, artifact scatter, and foundation, spread over a 1,120-square-meter area. The site contains a light scatter of domestic refuse appearing to date post-1930 to the

1960s. A property records search indicates that a house was first constructed on this site in 1929, and then modified or rebuilt in 1950. A utility pole on the property presumably constructed for the residence has studs showing dates of 1945 and 1949. A house pad with a fairly modern driveway leading up to it still exists. No foundation remains of the house are present, but a smaller foundation is located approximately 45 m to the east among abandoned farm equipment that appears to date to the 1930s and 1940s. A total of 23 pieces of farm equipment are present, as are fragments of ceramic and glass vessels, miscellaneous metal hardware, and a ca. 1930s Dodge flatbed pickup truck. All of the equipment and the truck are in a state of disrepair and not functional. A working avocado orchard comprises the surrounding area.

- **19-186943:** Historic remains of the Cal-Baden Mineral Springs constructed by Gus Gregg in the 1930s. The site consists of a concrete, tile, and mortar wall enclosing foundations, walkways, plumbing fixtures, and stairs that represent a portion of the historically developed mineral springs. Another series of foundations and stairs are located to the east. No artifacts were observed, but the area is overgrown with vegetation, and artifact scatters or additional features are likely present.
- **19-100504:** Isolated granitic bifacially ground mano, unshaped, measuring 12.2 x 9.5 x 5.5 centimeters (cm).
- **19-100505:** Isolated metavolcanic scraper measuring 9 x 6.5 x 2 cm.

4.2.1 Criteria for Evaluation

The criteria for listing resources on the California Register are based on those developed by the National Park Service for listing in the National Register. The federal criteria have been modified in order to include a broader range of resources that better reflect the history of California. A property must be significant at the local, State, or national level under one or more of the following four criteria:

1. It is associated with events or patterns of events that have made a significant contribution to the broad patterns of the history and cultural heritage of California and the United States.
2. It is associated with the lives of persons important to the nation or to California's past.
3. It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. It has yielded, or may be likely to yield, information important to the prehistory or history of the State and the nation.

Additionally, the integrity or authenticity of a property's physical identity, historic context, and visibility of physical features are all factors considered when determining whether properties are eligible for listing in the California Register. Restrictions that apply to California Register listings include moved buildings, structures, or objects; properties achieving significance within the past 50 years; and reconstructed buildings. Consult Appendix J for additional discussion of the criteria.

4.2.2 Evaluation of Cultural Resources within the Preserve

The field survey resulted in the identification of nine previously undocumented cultural resources within the Preserve. LSA evaluated all of the identified cultural resources under California Register criteria. Recommendations for eligibility for the California Register are summarized in Table F, with detailed explanations regarding these conclusions included in Appendix J.

Table F: Recommendations for California Register Eligibility

Temporary Number	Resource Type	Determination of Eligibility/Criteria
19-003342	Historic	Not eligible
19-186935	Historic	Not eligible
19-186936	Historic	Not eligible
19-186937	Historic	Not eligible
19-186938	Historic	Not eligible
19-186939	Historic	Not eligible
19-003341	Historic	Eligible/Criterion 1
19-003345	Historic	Not eligible
19-186943	Historic	Not eligible
19-100504	Prehistoric	Not eligible
19-100505	Prehistoric	Not eligible

Of the nine documented cultural resources, it was recommended by LSA that only the remains of the Whittier Oil Field (19-003341) in the southern Puente Hills are eligible for inclusion in the California Register. Although the wells themselves have been dismantled, the roads and associated markers and well pads indicate quite clearly the original configuration, placement, and design of the oil field. In addition, the lack of development in the area has preserved the setting. Due to this, the essential physical features of the oil field with regard to location, setting, association, and feeling still exist, and there is minimal loss of integrity.

The Southern California oil industry began in the late 1800s in response to growing oil demands of the nation as a whole due to the Industrial Revolution of the 19th Century. The industry continued to flourish as oil demands increased with the support of World War I and World War II and was instrumental to the growth of the California economy. The Whittier Oil Field was known among oil men in California as the “Best in the State” (The Whittier News Annual Edition 1920) because it was low in sulfur, easily refined, and made good lubricating stock. The fields also contributed to the economic development of the United States since oil-industry workers and their families came from other parts of the country, especially Pennsylvania, where oil was first found in 1859. Oil from the fields was transported to other areas of the nation as well as overseas (The Whittier News Annual Edition 1920). The Whittier Oil Field has made a significant contribution to the broad patterns of the history of California and the United States. Therefore, it was recommended that 19-003341 is eligible for inclusion in the California Register under Criterion 1 (LSA 2006).

4.3 PALEONTOLOGY

The paleontological resource assessment performed September 21 to September 27, 2004, included a locality search through the Los Angeles County Museum of Natural History and records maintained at LSA and also a field survey component. The purpose of the assessment is to determine whether paleontological resources are present within the Habitat Authority jurisdiction boundary, and if so, to assess their importance and recommend mitigation measures to reduce potential impacts to levels that are less than significant, as required by CEQA. Work was also conducted in accordance with paleontological mitigation guidelines developed by the Society of Vertebrate Paleontology (SVP 1995). Additional information pertaining to the paleontological resource assessment is provided in Appendix K.

No surficial paleontological resources were identified during the field survey. However, the Preserve is underlain by Cenozoic sediments of the Puente, Fernando, Coyote Hills, and La Habra Formations. Oil has been routinely produced from the first two Formations listed since 1897. The Puente (David 1943; Sundberg 1984 and 1991), Coyote Hills, and La Habra (Miller 1971) Formations are known to contain extensive fossils of marine and terrestrial plants, invertebrates, and vertebrates. These named Formations are considered to have a High Sensitivity in regard to their potential for containing fossils. Recent alluvial sediments, filling the valley bottoms of the Preserve, are considered to have a Low Sensitivity since they were deposited since the Pleistocene.

The results of the locality search indicate that no vertebrate fossil localities have been documented directly within the Preserve boundaries. However, the same sedimentary deposits that occur within the Preserve boundary are also found nearby. The closest fossil vertebrate localities are all from around the Puente Hills Landfill immediately north of the northeasternmost parcel of the Preserve. Localities here have produced a suite of fossil marine vertebrates, including great white shark, herring, hake, lanternfish, mackerel, swordfish, flounder, and whale. In the Puente Formation (Sycamore Canyon Member), also near the Puente Hills Landfill, a specimen of fossil whale was found.

The locality search indicated that shallow excavations in the younger Quaternary Alluvium found in the various drainages of the Preserve are unlikely to yield fossil material. Alluvium is a geologically recent deposit of gravel, sand silt, or mud that was deposited by flowing water in a stream or river. It is found along old and active stream and river drainages and is usually loosely consolidated. However, the locality search also indicated that substantial deep excavations in the bedrock marine deposits of the Miocene Puente Formation could hold significant fossil vertebrate remains. Mitigation measures to ensure that the potential impacts from ground-disturbing construction activities are minimal are provided in Sections 5.3.2 and 6.3.

5.0 MANAGEMENT GOALS AND OBJECTIVES

The Preserve is a 3,860-acre collection of properties that together represent some of the last open space in Los Angeles County. Bordered by development on three sides, the Preserve is located between the conserved lands of the Whittier Narrows Recreation Area to the west and a combination of private unreserved and public reserved lands of Chino Hills State Park and Cleveland National Forest to the east. The Preserve functions as a habitat linkage between these lands. In its role as land manager, the Habitat Authority desires to maintain and enhance the biodiversity of the Preserve by overseeing edge effects from nearby urbanization, ensuring that the land continues to be a viable habitat linkage.

Guiding this section are the Mission and Vision of the Habitat Authority, two concepts that are crucial in mapping the overall direction for resource management. This section first delineates management zones within the Preserve. Management zones assist land managers in identifying general locations of the Preserve and provide the basis for delineating resource objectives.

Section 5.0 provides Preservewide goals and objectives related to resource management, public use, cultural resources, and facility management. These goals and objectives are intended to implement the Mission and Vision for the Habitat Authority as time and agency resources such as funding and available personnel permit. Priority allocations of available resources will be in alignment with the Vision and Mission Statements of the agency. Management of the Preserve will accommodate public use insofar as the primary intent to acquire, restore, and maintain the natural resources is being achieved.

5.1 BIOLOGICAL CONSTRAINTS AND MANAGEMENT ZONES

The Preserve is an ecologically significant area that supports a wide diversity of species and native vegetation communities. The Preserve's unique assemblage of resources provides a crucial habitat linkage between large tracts of open space in the San Gabriel and Santa Ana Mountains. A biological constraints map (Figures 10a and 10b) was created to provide an overview of the relative value and importance of the biological resources within the Preserve, grouped loosely by watershed (labeled A through X). Watersheds were ranked by sensitivity after taking into account the location of sensitive plant and animal species, sensitive habitats, and the presence of the indicator species described in Table H (Section 6.2.3). (Indicator species help to identify the overall condition of a habitat and other species utilizing that habitat.) More specifically, watersheds were ranked by "species count," which is the sum of the total number of sensitive species and the total number of different indicator species. The higher the number, the greater the number of sensitive and indicator species present, and therefore the more critical the area is to preserve or manage. Sensitive vegetation types, including coastal sage scrub, native grassland, riparian, and woodland habitats are also identified in each of the 24 watersheds. The numbers associated with these habitats relate to the numerical code assigned to a specific vegetation type (i.e., coast live oak woodland or walnut woodland) by the Orange County Vegetation System (Gray and Bramlet 1992). The constraints map is intended to guide the Habitat

Authority in land use planning (such as public use) and prioritize resource management activities in the Preserve.

As shown on the map, watersheds E (Sycamore Canyon) and I (Lower Turnbull Canyon) have the highest species count (23–26 species) and watersheds H (south of Hellman Park), P (La Habra Heights), S (Upper Powder Canyon), and R (Hacienda Heights) have the lowest (6–8 species). All of the other watersheds support intermediate amounts of the sensitive and indicator species.

The constraints map was consulted in the delineation of management zones in the Preserve. These zones are an attempt to spatially define the management scheme for the Preserve. Management zones allow for describing management goals by area or showing relationships between one area and another in terms of land use and management strategies. Zones may be based on geographic relationships; resource values; ecological parameters; management issues, goals, or objectives; types and intensities of land use; or visitor use and experiences. To assist land managers and Preserve personnel in identifying appropriate uses within the Preserve, two management zone classifications have been created: Preservation and Core Habitat (Figure 11).

The management zones reflect consideration of a number of factors, including existing and potential resource values, type and intensity of recreation use, and the practicalities of everyday management and operations. The intent of the land use designations is to reflect the varying physical, social, and management attributes through the Preserve and to provide a framework for making future management decisions. Physical attributes include the extent of development and resource quality or degradation. Social attributes of an area include intensity of visitor use and recreation diversity. Management attributes of an area include management presence, recreation facilities and public access, and the type of natural and cultural resources present. In this way, different recreation uses, natural resource values, and visitor experiences throughout the Preserve are recognized and managed differently.

In the Preserve, the degree to which these attributes are present varies from intensely used areas such as Turnbull and Powder Canyons to the more wildland setting of Sycamore Canyon. The determinations of land use designation, then, are based on the degree of these various attributes within each management zone. The general definition for each land use designation is presented below.

5.1.1 Preservation Zone

A Preservation Management Zone preserves habitat values along with compatible recreational and access uses. This designation would allow for existing passive, low-impact recreation. Within this zone, some trails may be designated or signed for specific uses such as hiking only, or excluding other uses such as dogs, horses, or bikes. All recreational uses are limited to trails unless specifically signed or otherwise designated. In addition, areas labeled as Preservation would, under uncommon circumstances, be closed to the public for safety issues (landslides, threat of wildfire, or other health and safety issues) or seasonal closures for sensitive, threatened, endangered, or locally rare breeding birds or other wildlife. These seasonal closures may consist of limiting dog, horse, bike, or hiking activities. Seasonal closures would be determined by reasonable biological information or natural events that are not within the Habitat Authority's control.

5.1.2 Core Habitat Zone

A Core Habitat Management Zone includes, but is not limited to, those areas that have not been opened to the public, and would generally remain off-limits for the sole purpose of providing undisturbed habitat for wildlife, which contributes to sustaining the overall ecological health of the Habitat Authority’s jurisdiction. Core habitat is generally defined as an area that can sustain a population of plants or animals. These areas provide food, shelter, a place to safely reproduce, and depending on how large the habitat, a place for young to disperse. Other areas that could be considered core habitats are those that support listed species, riparian areas, or other specifically designated areas. Permissible activities include authorized biological survey and some restoration and/or invasive species removal, but no unsupervised public access.

The designated Core Habitat is an area called La Cañada Verde, which is north and west of the Arroyo Pescadero Trailhead. This area currently provides undisturbed breeding habitat for wildlife and native vegetation, which is recovering in the absence of human disturbance.

5.2 THREATS AND POTENTIAL IMPACTS

The Preserve’s key management challenges stem from its proximity to residential development, while certain issues, such as invasive plant infestations, stem from historical land uses and are exacerbated by current environmental conditions. Table G identifies the most significant threats to the native habitat and sensitive species located within the Preserve and lists the potential impacts that are likely to result from these threats. Habitat fragmentation, invasive plant species, the urban edge effect, public use, and erosion constitute these main threats. The RMP is designed to address these threats and minimize the impacts while upholding the mission of the Habitat Authority. Management guidelines that address these issues are provided in Section 6.0.

Table G: Analysis of Main Threats and Potential Impacts for the Preserve

Threats	Potential impacts
5.2.1. Habitat Fragmentation	
Biocorridors become increasingly important for plants and wildlife as human development encroaches upon natural areas or isolates them from other protected areas, yet even the biocorridors within the Preserve are threatened by human development.	<ul style="list-style-type: none"> • Movement of wildlife and genetic material is hindered, resulting in the extirpation or isolation of species • Habitat fragmentation contributes to the “urban edge effect”
5.2.2. Invasive Plant Species	
Invasive plant species are outcompeting native species in areas of the Preserve.	<ul style="list-style-type: none"> • Invasive plant species degrade existing native habitat and reduce the biodiversity • Invasive plant species compete with native plants for resources and habitat and prevent seedling establishment • Invasive plant species may displace native wildlife
5.2.3. Urban Edge Effect	
The Preserve is surrounded by urban area along most of its boundaries, and the fuel modification	<ul style="list-style-type: none"> • Exotic plant and animal species are introduced and degrade the natural environment by outcompeting

Table G: Analysis of Main Threats and Potential Impacts for the Preserve

Threats	Potential impacts
<p>required along these areas further increases the effects of the urban edge.</p>	<p>or preying on native species</p> <ul style="list-style-type: none"> • Prevents native wildlife from using habitat along the periphery of the Preserve or puts them at risk for predation by feral or domesticated animals when they do move out into this region • Contributes to an increase in frequency and severity of wildfires • Fragmentation caused by unauthorized trails adjacent to residential areas • Anticoagulants, which are used to kill rodents, have rippling, harmful effects on all levels of carnivores in the ecosystem • Ambient lighting and noise can disturb wildlife and ecosystem functioning • Artificial water sources and public feeding of wildlife disrupts the natural cycle of nature • Unauthorized collecting and harassing of wildlife at the Wildland Urban Interface (WUI) • Unsecured backyards can act as artificial food sources for wildlife
<p>5.2.4. Public Use</p>	
<p>The existing trail network within the Preserve evolved from old roads, which were not created with consideration of the sensitivity of the surrounding habitat, and off-trail use by visitors has facilitated the development of unauthorized trails and shortcuts.</p>	<ul style="list-style-type: none"> • Overuse and inappropriate uses of trails—both authorized and unauthorized—contribute to erosion, alteration of natural drainage patterns, introduction of exotic vegetation, degradation of native vegetation, and increased human-wildlife interactions • Degraded trails create difficult or unsafe trail conditions for visitors • Expanding and eroding trails may contribute to habitat fragmentation.
<p>5.2.5. Erosion</p>	
<p>Unrestricted and improper land use practices which took place prior to acquisition by the habitat authority have resulted in severe accelerated erosion in parts of the Preserve. Poorly designed roads, trails, and areas without vegetation on steep slopes are the most susceptible to erosion.</p>	<ul style="list-style-type: none"> • Increases sedimentation in streams and watercourses • Degrades water quality (increased turbidity) • Reduces habitat value in riparian and wetland ecosystems from siltation • May create hazardous trail conditions from rills and gullies for hikers, bikers, and equestrians; stimulates creation of alternate unauthorized trails • Reduces soil productivity and water-holding

Table G: Analysis of Main Threats and Potential Impacts for the Preserve

Threats	Potential impacts
	capacity <ul style="list-style-type: none"> • Alters natural drainage patterns • Increases velocity and amount of storm water runoff • Scarred/barren areas reduce aesthetic values • Results in habitat loss

5.2.1 Habitat Fragmentation

Habitat fragmentation may occur on either a local or regional level. Local fragmentation of habitat can be caused by activities within the area that damage the functionality of the habitat. Examples of these are trails, roads, erosion, invasion by exotic weeds, and development. Regional fragmentation results from isolating large tracts of open space from other large tracts of undeveloped land. If corridors are not kept between these lands, they become isolated, and the movement of wildlife and genetic material (seed, spores, pollen, etc.) of plants and animals is diminished. This in time will reduce the viability and health of the smaller patches of isolated habitat, eventually resulting in the loss of certain species or even entire habitats.

Trails, major roads, and other smaller roads that cut across the Preserve and invasive weeds are decreasing the quality and functionality of the habitat. Other areas of the Preserve are fragmented and isolated from each other by roads. Hacienda Boulevard, a major chokepoint cutting across the Preserve, is one such area where the Habitat Authority continues to work on acquiring additional land to protect this vital linkage.

The Puente-Chino Hills are well-known for their strategic location between large tracts of open space in the San Gabriel and Santa Ana Mountains. The connection to Chino Hills has not been secured because a large open space area between Powder Canyon and Chino Hills remains in private ownership. The connection to the north is more tenuous via a 12.5-mile, largely channelized stretch of the San Gabriel River.

5.2.2 Invasive Plant Species

Invasive plants are a threat to open space because they colonize disturbed areas and degrade existing native habitat. The invasive plants “alter ecosystem functions such as nutrient cycles, hydrology, and wildfire frequency, outcompete and exclude native plants and animals, harbor dangerous animal invaders, and hybridize with native species” (Bossard et al. 2000).

A great deal of disturbance in the Puente Hills in the past, from oil activities to cattle grazing, has allowed nonnative invasive plants to take hold within the Preserve. In some of these areas the weeds have caused significant damage and are not allowing the disturbed areas to recover and fill in with native vegetation. The management of the invasive plants will be an important component of the continued health and vitality of the Preserve.

5.2.3 Urban Edge Effect

Urban areas in proximity to the Preserve may cause negative effects. Some of these effects are light and noise pollution, exotic pests, feral pets, exotic plants, diseases, fire, and pollution. These effects can deter animals from using the habitat along the edge of the Preserve, which in turn reduces the overall usable acreage of the Preserve. Interactions may occur along the urban edge from animals in the Preserve venturing into the urban area to roam and forage.

The Preserve in the Puente Hills has urban development along most of its boundaries. One of the obvious effects of the urban edge is the fuel modification required along these areas. Fuel modification impacts the native habitat and reduces the overall acreage of the Preserve. The ornamental plants in the urban areas may move into the Preserve and if not monitored can become established. Domestic/feral pets enter the Preserve to roam and forage for food. These animals may compete with native animals for food or prey on the native animals themselves and may also introduce disease to native populations. The best way to reduce these and other urban edge effects is to educate the public who live along the edge of the Preserve concerning the importance of the Preserve and ways they can reduce impacts to it.

5.2.4 Public Use

Human use has the potential to cause extensive degradation of the natural and cultural resource values of open space areas. Overuse and inappropriate uses of the extensive trail network can have negative environmental effects through alteration of natural drainage patterns, erosion and deposition of soil, introduction of exotic vegetation, hunting, and increasing human-wildlife interactions. Degraded trails also diminish the quality of the visitor experience by creating difficult or unsafe trail conditions, promoting trail use conflicts, and impacting the scenic quality of the landscape. Hunting is not allowed within the Preserve, nor will it be in the future.

The existing trail network has evolved from old roads and utility access roads that were not always constructed or maintained with sensitivity to the environment. In addition, a long history of uncontrolled access has facilitated the development of visitor-created unauthorized trails and shortcuts. Steep trails without adequate ground cover are heavily eroded, with cutting and compaction along their edges. In some areas, trails act as drainage ditches carrying water during storm events. In addition, off-trail use by people and pets tramples native vegetation, degrades habitat, disturbs wildlife, and promotes invasive exotic species growth.

5.2.5 Erosion

Erosion, the process by which soil particles are displaced and transported by wind or water, occurs naturally from weather or runoff. Human land use practices such as unrestricted construction, agriculture, removal of vegetation or mulch, paving, or heavy repeated trampling can cause accelerated erosion beyond natural levels. Erosion reduces soil quality and water-holding capacity by removing the nutrient-rich upper layers of the soil. Erosion can result in increased sedimentation in wetlands, streams (including riparian habitats), and watercourses; degradation of water quality; and reduction of water storage capacity. Erosion often results in the actual loss of native habitat. The extent of erosion depends on a combination of factors, including the amount and intensity of rainfall, soil type, slope length and steepness, and ground cover (vegetation, litter/mulch, rocks). Soil

erodibility is a function of texture, organic matter content, structure, and permeability. In general, areas with erosive soils on long steep slopes with little or no cover will be most susceptible to erosion.

Past land practices in the Puente Hills, from oil drilling to cattle grazing, have left a legacy of poorly designed roads that are the primary source of erosion within the Preserve. Roads are especially likely to cause increased rates of erosion because they compact soils, remove ground cover, and concentrate runoff flows. The creation of unauthorized trails, particularly downhill mountain biking trails in steep hillside areas, has also exacerbated conditions that are conducive to erosion through similar mechanisms.

5.2.6 Existing Fuels and Fire Hazard Conditions

The Mediterranean climate of the Puente Hills region—which is characterized by wet, mild winters and dry, hot summers—is conducive to producing an abundance of fire fuel because of the long growing season. However, just as the vegetation in the Preserve is adapted to long periods without rain, there are certain plant communities such as chaparral that have fire-based regeneration requirements. Fire suppression, heavy rains, and seasonal or prolonged drought can all yield excessive fuel (e.g., plant material) accumulation. Excessive fuel loads have the potential to result in wildfires that pose a threat to surrounding homes and communities and even the native vegetation itself. Major wildfires can adversely impact native habitat in several ways. A very hot fire, due to high fuel loads, can sometimes completely destroy plants that would otherwise recover from lighter burn damage. The increased chance of postfire erosion and subsequent invasion of exotic plant species can also have detrimental effects on natural communities. Finally, firefighting activities, such as creating fuel breaks with bulldozers, can permanently damage natural vegetation. In summary, while native plant communities are well-adapted to natural fires, the human perturbations of the natural cycles adversely affect these communities.

5.3 MANAGEMENT GOALS AND OBJECTIVES

In response to the Mission and Vision Statements, the following goals and objectives outline a management framework designed to protect and restore the Preserve's natural resources. Goals and objectives are necessary to perpetuate the Preserve's important natural, cultural, scenic, and recreation values and to respond to threats to those values. This section describes resource management direction along with elements of existing policies, programs, and protocols for natural resource management.

The goals and objectives are divided into Resource Management, Interpretation, and Preserve Maintenance and form the basis for the management and monitoring actions described in Section 6.0. A biological goal is a statement of intended outcome of management based on the feasibility of enhancing, maintaining, or restoring species populations and habitat. A public use goal is the statement of the type and level of public use compatible with biological goals. Objectives state the intended results for management actions that promote the resource, interpretation, and maintenance goals for the Preserve. The management actions that follow in Section 6.0 are intended to implement these objectives. While the achievement of goals and objectives will be based on the availability of

agency resources such as personnel and funding, priority spending of available resources will be in alignment with the Vision and Mission Statements of the Habitat Authority.

5.3.1 Biological Resources Element

The management guidelines for the biological resources in the Preserve are based on analysis of all existing site-specific survey data and literature; soil, vegetation, and wildlife surveys; and information gathered from databases to assist in the discussion of invasive plant species, sensitive species, and habitats. The major intent of the following goals and objectives is to provide a strategy by which the natural resources of the Preserve can be managed, conserved, and enhanced, while at the same time providing educational and recreational opportunities to the public.

Section 3.0 (Natural Resources) of this document contains the results of research, site assessment, and survey work performed by the Project Team related to natural resources. Nine major vegetation types—coastal sage scrub, chaparral, grassland, riparian, woodland, cliff and rock, agricultural, and developed and disturbed—were identified within the Preserve. Of these, the annual grassland habitat covers the largest area, and it is dominated by nonnative annual grasses and invasive herbaceous plants such as black mustard. Although many of the dominant species found in annual grassland are not native, they have been present in Southern California for hundreds of years; elimination of these species would be nearly impossible. In addition, these annual grasslands provide habitat for a variety of species, especially raptors. Rather, control efforts will be focused toward particularly invasive plant species, including Italian thistle, fennel, and castor bean, which are present to varying degrees throughout the Preserve and are the major obstacles to restoration. However, there are plenty of opportunities for conservation, as the Preserve contains pristine remnants of the native habitat of Southern California: coastal sage scrub, needlegrass grassland, sycamore riparian woodland, coast live oak woodland, and black walnut woodland, which are all considered to be sensitive habitats.

Invasive plant species, habitat fragmentation, and the urban edge effect have threatened the viability of native habitat and wildlife and sensitive species. As discussed in Section 3.5 above, at least 30 sensitive species are known to occur within the Preserve. By restoring and preserving habitat, ensuring that wildlife corridors exist between fragmented habitats, and educating Preserve visitors and neighbors, the future of these sensitive species will become more secure.

The following management goals and objectives are not mandates and are intended to identify gaps in knowledge and suggest ways to eliminate them, establish sound data management and monitoring techniques, and provide the framework that will assist Preserve managers in making informed management decisions.

Goal

BIO-1: Acquire remaining open space that strengthens the ecological functioning of the Preserve.

Objectives

BIO-1.1 Identify the remaining private and public open space properties surrounding the Preserve. Prioritize the parcels based on the quality

of the biological resources and functions they support. Periodically update the information as necessary.

- BIO-1.2 Evaluate offsite areas not owned by the Habitat Authority as connection routes to the lands owned or managed by the Habitat Authority for large mammals to minimize constraints to large mammal movement within the Preserve. The 31-mile Puente-Chino Hills Wildlife movement corridor extends from Whittier Narrows east to the Cleveland National Forest. The lands owned or managed by the Habitat Authority are surrounded by residential development on three sides. To maintain the integrity of the wildlife movement corridor, it is critical that it is connected to other habitat areas to the east and that adjacent or new development does not impede wildlife movement within the Preserve.
- BIO-1.3 Acquire properties that complement the preservation goals of the Preserve. Potential properties for acquisition may support preservation of cultural or visual resources, may contain access opportunities that complement the purpose of the Preserve, or may contain especially valuable habitat or restoration opportunities.
- BIO-1.4 Collaborate with other regional conservation groups on available land acquisition.

Goal

BIO-2:

Address risk of wildfires along the wildland urban interface.

Objectives

- BIO-2.1 Prepare a Wildfire Management Plan. Collaborate with City and County fire jurisdictions to prepare a wildfire management plan that is compatible with biological goals and the safety and well-being of the surrounding residential communities.
- BIO-2.2 Integrate fire safety and vegetation management. Collaborate with the local fire jurisdictions on different strategies that are available to maintain diverse plant composition such as thinning certain vegetation or other measures.
- BIO-2.3 Strongly encourage all new development adjacent to the Preserve to accommodate all fuel modification within the footprint of the development site. Review offsite development proposals and coordinate with lead agencies to ensure that potential fuel modification impacts to the Preserve are eliminated, minimized, or adequately addressed and mitigated.

Goal

BIO-3: Maintain all populations of native plants and wildlife with special emphasis on management of locally uncommon, sensitive, federally-threatened or endangered species and other sensitive resources.

Objectives

- BIO-3.1 Protect and maintain coastal sage scrub breeding habitat for the federally-threatened coastal California gnatcatcher and other scrub species.
- BIO-3.2 Protect and maintain breeding habitat for the western spadefoot toad.
- BIO-3.3 Protect and maintain populations of sensitive, threatened, or endangered plant species.
- BIO-3.4 Protect and maintain nesting and foraging habitat for sensitive, threatened, or endangered raptor species.
- BIO-3.5 Protect and maintain nesting and foraging habitat for Indicator Species, defined as locally uncommon or declining species in Los Angeles County.
- BIO-3.6 Protect and maintain all native vegetation communities paying special attention to sensitive vegetation types such as walnut woodland, oak woodland, coastal sage scrub, riparian communities, and native grassland.
- BIO-3.7 Encourage new development adjacent to the Preserve to provide an appropriate buffer zone on the development site to minimize edge effects. Promote additional methods to minimize potential edge effects with new and existing urbanization.

Goal

BIO-4: Enhance and restore degraded habitats in the Preserve.

Objectives

- BIO-4.1: Implement a habitat restoration plan (as in Appendix N). Determine restoration priorities based on weed and soil associations, percent slope, size of weed infestation, proximity to roads and trails, proximity to existing restoration, wildlife connectivity, or other criteria consistent with the Preserve Mission and Vision.
- BIO-4.2 Abandon all unauthorized trails and roads within the Preserve to improve the quality of habitat for wildlife.

- BIO-4.3 Explore the use of selective fuel reduction to increase native vegetation, maintain a diverse age structure, and restore biotic and abiotic processes to the vegetation community.
- BIO-4.4 Monitor the spread or invasion of exotic species in the Preserve and develop appropriate management responses.
- BIO-4.5 Develop a long-term invasive exotic plant management plan.

Goal

BIO-5: Implement monitoring programs designed to identify ecosystem threats and guide adaptive management of the Preserve by tracking the health, function, and integrity of habitats and ecological processes.

Objectives

- BIO-5.1 Monitor all native habitat types within the Preserve to assess their condition and to document any changes that are a result of specific management recommendations.
- BIO-5.2 Monitor key ecological processes to interpret biological changes and responses to management measures.
- BIO-5.3 Document the status of locally uncommon, sensitive, threatened or endangered species and other sensitive or special status resources within the Preserve in order to prioritize management actions and to assess the effectiveness of management actions.
- BIO- 5.4 Monitor the effects of urban runoff and soil deposition from surrounding areas on the Preserve.
- BIO-5.5 Continue to implement measures to restore habitat and improve habitat quality along with enforcement of existing park rules designed to reduce nutrient loading and sedimentation potentially impacting beneficial uses in the watershed.

Goal

BIO-6: Encourage university-level research to address unanswered fundamental biological questions.

Objectives

- BIO-6.1 Facilitate focused research projects.

Goal**BIO-7: Develop an in-house data storage and analysis system.****Objectives**

BIO-7.1 Develop a centralized data management system that interfaces with regional and statewide biological database systems (e.g. BIOS).

5.3.2 Cultural Resources Element

LSA performed a cultural resources assessment to document and evaluate historical resources. The study included conducting records searches and field surveys and summarizing the findings in the existing conditions section of the RMP. The goal of the study was to identify significant resources that may be affected by an undertaking within the Preserve; to assess project impacts on those resources; and to develop management guidelines to avoid, offset, or eliminate adverse impacts.

The records research indicated that 12 historic properties have been recorded within 0.5 mile of the Habitat Authority jurisdiction boundary, but that no cultural or paleontological resources were recorded within the Preserve itself. No properties are listed on the National Register, California Register, California Historical Landmarks, California Points of Historical Interest, or Historic Properties Directory within 0.5 mile of the circuit. The field survey resulted in identifying nine previously undocumented cultural resources within the Preserve. Currently, only the remains of the Whittier Oil Field (LSA-PUE430-S-7) in the southern Puente Hills are eligible for inclusion in the California Register.

The paleontological resource assessment included a locality search and also a field survey component. Work was also conducted in accordance with paleontological mitigation guidelines developed by the SVP (1995). No surficial paleontological resources were identified during the field survey. However, the Preserve is underlain by Cenozoic sediments of the Puente, Coyote Hills, and La Habra Formations, which are known to contain extensive fossils of marine and terrestrial plants, invertebrates, and vertebrates. These named formations are considered to have a High Sensitivity in regard to their potential for containing fossils. The locality search also revealed that recent alluvial sediments underlying the Preserve are not as likely to contain paleontological resources.

Goal**CULT-1: Protect and preserve important cultural resources.****Objectives**

CULT-1.1 For internal use, maintain maps of all cultural and paleontological sites. Monitor these sites to ensure that they are not harmed. Protect these sites using generally accepted methods of preservation.

- CULT-1.2 Perform cultural resources surveys in sensitive areas that are currently obscured by vegetation if there is a fire or other activity where the ground visibility becomes clear.
- CULT-1.3 Allow local Tongva/Gabrieleno tribes to use these sites if compatible with the RMP.

Goal

CULT-2: Preserve and interpret the remains of the Whittier Oil Field as a significant historic site for the education and enjoyment of Preserve visitors.

Objectives

- CULT-2.1 Allow the definitive elements of the oil field to remain in place and be passively managed.

Goal

CULT-3: Follow established protocol if human remains are encountered during ground-disturbing activities in the Preserve.

Objectives

- CULT-3.1 Comply with State Health and Safety Code Section 7050.5 which states that no further disturbance should occur at a site until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98.

Goal

CULT-4: Record, identify and preserve paleontological resources if found on the Preserve.

Objectives

- CULT-4.1 A paleontologist who is on the County of Los Angeles list of certified paleontologists should be retained and remain on site during all rough grading and other significant ground-disturbing activities in paleontologically sensitive sediments, which include the Miocene Puente Formation, the Pliocene Fernando Formation, and the Pleistocene Coyote Hills and La Habra Formations. A paleontologist will not be required on site for excavation in Quaternary colluvial/alluvial sediments unless it is determined that these sediments do in fact contain paleontological resources. A paleontologist will not be required on site if excavation is only occurring in artificial fill.

5.3.3 Public Use Element

The Habitat Authority's existing practice is to allow pedestrian and equestrian access to most trails and fire roads and to allow bicycles access to most fire roads and some designated trails. Since its primary goal is to preserve and protect native habitat, the Habitat Authority will be evaluating the network of roads and trails on a continual basis and looking for opportunities to implement management actions to minimize impacts on soils, water quality, native habitat, and wildlife. Also, consistent with its purpose, the Habitat Authority will focus on improving the current network of roads and trails and will evaluate limited new trail routes.

Goal

USE-1: Provide a trail system that protects natural resources of the Preserve.

Objectives

- USE-1.1 Consistent with the Habitat Authority's purpose, abandon roads and trails if impacts on native habitat or other resources are discovered.
- USE-1.2 Locate new trails away from sensitive habitat areas.
- USE-1.3 Minimize riparian crossings to decrease disturbance of sensitive natural areas.
- USE-1.4 Consistent with the Habitat Authority's purpose, make decisions to reconstruct or reroute existing trails and emphasize minimizing ground disturbance.
- USE-1.5 Consistent with the Habitat Authority's purpose, provide diverse and interesting trail experiences to minimize unauthorized trails.
- USE-1.6 Use best management practices in the design, construction, and maintenance of trails, including temporarily closing trails when needed.
- USE-1.7 Implement trails in partnership with other public agencies, nongovernmental organizations and private landowners when feasible.
- USE-1.8 Implement a trail system that is considerate of adjacent landowner interests as much as possible and consistent with protecting natural, visual, and cultural resources.
- USE-1.9 Consistent with the Habitat Authority's purpose, continue efforts to close key gaps in the trail system and to create an interconnected system of public open spaces along the Schabarum Trail and from nearby communities of Whittier, Hacienda Heights, La Habra Heights, and Rowland Heights.

USE-1.10 Seek methods to establish partnerships among trail interest groups to improve cooperation on trail use, volunteer maintenance opportunities, and preservation of habitat consistent with the purpose of the Habitat Authority.

USE-1.11 Maintain trails in an environmentally sustainable manner by:

- Using natural materials
- Restoring damaged areas
- Reducing or avoiding the use of chemicals
- Minimizing disturbance of habitat
- Limiting runoff and grading

Goal

USE-2: Enforce protection of the varied resources and promote an enjoyable and safe environment for visitors.

Objectives

USE-2.1 Consistent with the purpose of the Habitat Authority, encourage uses that acknowledge the natural and scenic beauty of the Preserve and facilitate enjoyment of the outdoor experience, as well as those that promote the safety of visitors. The Preserve rules outline appropriate uses and restrictions on the use of the Preserve.

Goal

USE-3: Create a trail system that provides a broad public benefit by accommodating diverse uses and user abilities, consistent with the purposes of the Habitat Authority.

Objectives

USE-3.1 Consistent with its primary purpose, allow trail use on Preserve property.

USE-3.2 Permit use of fire protection roads by visitors on foot, on a bicycle, and with a horse, but limit any or all uses where the use is inconsistent with the Habitat Authority purpose.

USE-3.3 Discourage the use of trails that are not part of the system of maintained trails.

- USE-3.4 Prohibit the use of motorized vehicles in open space, with authorized exceptions.
- USE-3.5 Where reasonably feasible, provide access for people with disabilities within the context of the agency's purpose, policies, and legal requirements.
- USE-3.6 Connect Preserve trails to regional trails where appropriate.

Goal

USE-4: Accommodate parking, access points, and trail amenities that maintain the natural character of the land, enhance resource protection and contribute to the enjoyment of open space.

Objectives

- USE-4.1 Rely primarily on public rights of way to provide parking capacity to serve trail users arriving by motorized vehicles.
- USE-4.2 Seek to provide reasonable access points to eliminate excessive parking and avoid or minimize traffic to the surrounding community.
- USE-4.3 Allow trail amenities such as, but not limited to:
- Informational displays and signs;
 - Portable restrooms in areas with group use;
 - Facilities to provide water and tie horses;
 - Trash cans;
 - Facilities to encourage the pickup and disposal of pet waste; and
 - Potable water.

5.3.4 Interpretation

Through a variety of interpretive tools such as signs, kiosks, printed material, and public programs, the Habitat Authority will strive to educate the public on the importance of preserving the surrounding habitat not only for the wildlife, but for future generations to explore and enjoy.

The Habitat Authority will focus on creating interpretive programs that educate both individuals and communities on the importance of preserving, understanding, and coexisting with the natural resources.

Goal

INTERP-1: Enhance public stewardship of the Preserve, appreciation of the value of the Puente Hills Landfill Native Habitat Preservation Authority, conservation issues in general, and the property's significance within the Los Angeles basin consistent with the biological objectives of the Preserve.

Objectives

- INTERP-1.1 Provide high-quality educational and outdoor-learning opportunities.
- INTERP-1.2 Provide opportunities for community involvement and education.
- INTERP-1.3 Develop a public outreach and education program.
- INTERP-1.4 Continue partnerships with other environmental and educational organizations for public outreach and education.

Goal

INTERP-2: Provide a trail system that promotes and enhances public enjoyment and appreciation of the natural, cultural and scenic resources.

Objectives

- INTERP-2.1 Use signs, education and barriers to keep users on the trails.
- INTERP-2.2 When feasible, produce an accurate and informative trail map for the public, with trail safety guidelines, that is accessible from the Habitat Authority's website.
- INTERP-2.3 Provide trail users with accurate information on trail locations.
- INTERP-2.4 Provide information to trail users that facilitates orientation, natural and cultural resource interpretation, code compliance, and appropriate trail etiquette.
- INTERP-2.5 Educate trail users on the potential impacts that trail uses have on wildlife, cultural resources, and the environment.
- INTERP-2.6 Promote volunteer participation in trail stewardship.

5.3.5 Visual Resources and Aesthetics Element

The Preserve consists of a rugged landscape with steep hillsides surrounding deep canyons. Coastal sage scrub, walnut woodlands, riparian woodlands, grasslands, and southern oak woodlands provide habitat for wildlife such as bobcat, deer, red-tailed hawk, and mountain lion. These habitats contribute to the pleasure of experiencing and looking at an undeveloped landscape, a "wild" area in the midst of

a major metropolitan area. From an aesthetic standpoint, the Preserve benefits the surrounding urban environment by providing outdoor recreation, enhancing property values, improving the quality of life, stimulating the senses, offering a wealth of outdoor experiences, and giving unique perspectives to view the surrounding region. Potential impacts to this visual quality can include surrounding structures or development, degradation by exotic species, eroded trails or roads, aboveground utilities, abandoned oil equipment, or roadways that divide the landscape. The visual quality of the landscape, both views within the Preserve and views out to surrounding properties, is another key aspect of resource management.

Goal

VISUAL-1: Protect and enhance views and distinctive landscape features that contribute to the setting, character and visitor experience of the Preserve.

Objectives

- VISUAL-1.1 Expand interpretive opportunities associated with the visual and scenic resources of the Preserve.
- VISUAL-1.2 Protect views from within the Preserve to outlying properties. Evaluate proposed projects surrounding the Preserve with a priority to retain the visual quality of the Preserve's undeveloped landscape.
- VISUAL-1.3 Protect visitor experience of the Preserve from noise impacts.

5.3.6 Facility Maintenance Element

Goal

MAINT-1: Maintain facilities on the Preserve to ensure that biological resource values are maintained and that management activities are supported.

Objectives

- MAINT-1.1 Maintain facilities and infrastructure, such as gates, fences, and roads.
- MAINT-1.2 Maintain trailhead facilities and other structures that contribute to the integrity and value of the Preserve.
- MAINT-1.3 Maintain Preserve trails by clearing brush and performing other maintenance.

Goal

MAINT-2: Remove litter, trash and debris that may attract nonnative wildlife and reduce the aesthetic values of the Preserve.

Objectives

- MAINT-2.1 Establish responsibilities for removing trash and for regular collection at specific locations.
- MAINT-2.2 Enlist the help of volunteers for clean-up events at the Preserve.

Goal

MAINT-3: Establish facilities to enhance appreciation and encourage research about the natural resources of the Preserve.

Objectives

- MAINT-3.1 Participate with other agencies to develop an interpretive center to relate the biological and educational goals of the Preserve to the community and the public.
- MAINT-3.2 Develop guidelines for special or temporary use of the properties for activities such as special events or filming.

6.0 MANAGEMENT AND MONITORING IMPLEMENTATION

Recommended management and monitoring actions necessary to achieve the goals and objectives in Section 5.0 are summarized below and detailed in relevant sections of the Appendices. These management and monitoring actions may be implemented as sufficient agency resources become available. Priority allocations of available resources will align with the Vision and Mission Statements of the agency.

6.1 CURRENT AND PROPOSED MANAGEMENT ACTIVITIES

The implementation of this RMP will put into action a wide range of projects and management activities relating to biological resources management, cultural resources management, public use and interpretation, aesthetic protection, and Preserve maintenance. Current management activities will be enhanced and supplemented by proposed management activities.

6.1.1 Current Management Activities

Since 1996, the Mountains Recreation and Conservation Authority (MRCA) rangers have provided 120 hours per week of ranger services to the Preserve. They are on call 24 hours a day, 7 days a week. The services that the MRCA rangers provide for the Preserve generally fall into four main groups: Interpretation, Public Safety, Resource Management, and Maintenance.

The rangers conduct a variety of interpretive and outreach programs, including a junior ranger program, presentations to various groups and schools, nature hikes, and special community events and environmental programs. The rangers also protect public safety. As sworn California Peace Officers, the Preserve rangers are authorized to issue citations and make arrests while patrolling the properties. Rangers are trained wildland firefighters, are equipped to put out small fires, and are a vital part of the incident command system on larger fires. Rangers are also trained in providing emergency medical service, search and rescue, swift water rescue and flood rescue as first responders. A total of 25 Mounted Assistance Unit volunteers (on horseback) and 15 Mountain Bike Unit volunteers assist the rangers in patrolling the property and are trained in first aid and CPR.

Rangers, in upholding the main purpose of the Preserve, identify, protect, and maintain the various natural resources on the property. Routine and intermittent resource management activities include invasive nonnative plant removal, revegetation projects and native plant restoration, illegal activity prevention, vandalism prevention measures, fuel modification, and managing various wildland/urban interface situations.

Rangers also perform many duties to care and maintain the property. Some of these duties include the identification and correction of safety hazards and vandalism, removal of graffiti and litter, irrigation and maintenance of trees and plants, removal of weeds, repair of fences and gates, the installation and repair of signs or kiosks, construction of trails, and the maintenance of trails annually and as needed.

Los Angeles County camp crews and court referral workers assist the rangers with various maintenance duties. Rangers work closely with all surrounding agencies, routinely and during emergencies.

6.1.2 Proposed Management Activities

Proposed management of the Preserve will remain consistent with the Habitat Authority's Mission and Vision for the Preserve. As such, the Habitat Authority will protect and preserve the native habitat in the Preserve for the benefit of its natural resources. The Habitat Authority will continue to provide outdoor education and low-impact recreation consistent with resource protection goals. A more detailed description of the proposed projects and management activities is provided in Section 6.2.

Resource Management.

- Acquire properties that are contiguous to the Preserve for the purposes of protecting natural, cultural, and visual resources
- Prepare and implement a fire management plan (not a part of this document) that addresses all aspects of wildfire planning, including prevention, presuppression, and suppression
- Design and implement targeted studies and monitoring protocol to assist management decision-making and guide future management and monitoring activities
- Maintain a database of natural resources identified within the Preserve
- Implement a habitat enhancement and restoration plan using the data provided in Appendix N and the constraints map to identify areas of high restoration priority
- Eradicate exotic invasive plant species threatening the integrity of native habitat within the Preserve
- Develop a seed collection and storage program for particular sensitive species located within the Preserve to maintain and enhance biological diversity
- Enhance critical wildlife corridors within the Preserve by planting vegetative covers or installing fencing and exploring other measures to avoid, minimize, or reduce wildlife roadkill
- Conduct periodic field surveys or research studies and monitoring at future project sites in the Preserve to manage and protect potential cultural and paleontological resources
- Partner with local jurisdictions in the land use and development process to protect key views in the Preserve from existing and future visual and light intrusions from surrounding development

Public Use and Interpretation.

- Implement the proposed Trail Plan (Section 6.4.1) and provide kiosks, signs, or map pamphlets that clearly demarcate permitted use trails, authorized users for each trail, and summarize Preserve rules and regulations

- Establish proposed trails as part of the implementation of the proposed Trail Plan to provide loop opportunities for users
- Construct trailhead and parking facilities at the proposed Hadley Street and Turnbull Canyon Road entrances to the Preserve
- Develop a comprehensive interpretive plan (not a part of this document) for the Preserve and deliver interpretation and education using a wide range of methods including, but not limited to, brochures, signs and kiosks, special events and programs, and Web-based strategies
- Work with local recreation groups, neighboring jurisdictions, and the public to establish programs and events that promote Preserve stewardship and increase awareness of the Preserve's natural and cultural resources

Preserve Maintenance.

- Select and install erosion and sediment control practices where practicable, reasonable, and within the Habitat Authority's budget such as interceptor beams, culverts or drains, vegetation, mulch, contour wattles, permeable dams, or sediment traps
- Close and restore to natural condition any existing trails and roads that are no longer necessary to retain and are not included in the proposed Trail Plan as budget and resources allow; the biological constraints map and habitat restoration plan (Appendix N) will assist Preserve managers with prioritizing restoration activities
- Install fencing where appropriate to protect resources, post signs, establish permanent markers, and/or patrol the outer perimeter of the Preserve to enforce boundaries and permitted Preserve access
- Patrol public use of the Preserve to ensure public safety, compliance with rules and regulations, and assess the level of use by area of the Preserve
- Maintain Preserve facilities and structures (e.g., trails, parking lots, and kiosks) and remove litter, trash, and debris that may attract nonnative wildlife and reduce the aesthetic values of the Preserve

6.2 BIOLOGICAL RESOURCES MANAGEMENT

The fundamental objective for the RMP is to identify the best way to manage, protect, and enhance the biological resource values of the Preserve. The primary resource management guidelines proposed by the RMP include the acquisition of additional land for resource protection, fire management and fuel modification, biological research and monitoring within an adaptive management framework, data keeping and database management, habitat enhancement and restoration, exotic plant control, seed collection and storage, exotic animal control, and wildlife corridor maintenance.

6.2.1 Acquisition Criteria

The Preserve is managed for resource protection. Since 1996, the Habitat Authority has continued to acquire open space within its jurisdiction. Land acquisition provides the Habitat Authority with

opportunities to work toward protecting key parcels necessary to ensure the connectivity and biological integrity of the wildlife movement corridor and to address key management issues. Land should be strategically acquired when the opportunity arises, particularly in natural areas threatened by development. Future acquisitions should support the vision and mission of the Habitat Authority. The long-term preservation of biological and physical values is the primary function of the Habitat Authority. Sustaining and improving these values should be a high priority in evaluating future acquisitions and restoration.

- **Acquire properties that are contiguous to the Preserve from willing sellers for the purposes of protecting natural, cultural, and visual resources.** The Habitat Authority should coordinate and partner with other public land and natural resource management agencies, land conservancies, and other organizations in property acquisitions and in planning regional open space and resource (habitat, wildlife corridors) preservation needs.
- **Utilize the acquisition prioritization criteria to assist in making investment decisions.** On October 28, 2004, the Board of Directors adopted Acquisition Prioritization Criteria for the Habitat Authority. These Criteria will be used to prioritize remaining parcels for future acquisition (see Appendix L). The following criteria are listed below in order of importance:
 1. **Wildlife Corridors/Habitat Linkages.** Linkages connect protected areas and allow for wildlife movement. Parcels that currently constitute known or suspected wildlife linkages with no viable alternative will have top priority for acquisition. Second priority should be given to parcels that are immediately adjacent and provide direct access to a critical corridor segment.
 2. **Ecological Value.** Parcels that support endangered or threatened species, are used by sensitive plant and/or animal species, or support sensitive vegetation communities will have top priority for acquisition. Parcels that are large enough (or contiguous to other large areas) to provide essentially complete ecosystem needs for multiple species or temporary needs of migrating species will have secondary priority for acquisition.
 3. **Restoration Factors.** Top acquisition priority should be given to parcels that function with a minimum of habitat restoration necessary, with secondary priority given to those parcels that need restoring. However, priority can be given to parcels that have the potential to be restored to high-value habitat, including riparian or oak/woodland. Other restoration factors should be considered on a case-by-case basis: partially developed properties with structures may be easier or more difficult to restore, depending on the individual circumstance; fuel modification responsibilities may preclude or complicate restoration.
 4. **Opportunity for Joint Recreational Use.** Priority should be given to parcels that accommodate significant public access without seriously impeding value to wildlife, or that have existing widely used public trails. A second priority should be given to parcels that contain a suitable site for a recreational improvement such as a trail or interpretive center.
- **Incorporate other factors particular to a specific parcel.** Other factors may not be suitable for evaluation with the above criteria. Factors such as the size of a parcel, topography, extremely excessive fuel modification requirements, or extremely valuable land for restoration may be significant contributing factors to incorporate into the decision-making process.

6.2.2 Fire Management and Fuel Modification

The proximity of residential development to the Preserve creates the need to consider wildfire safety within the Preserve and in surrounding communities. Fire management is also an important tool in maintaining and restoring native vegetation and control of invasive exotic plant species.

Fuel Modification. Guidelines that may be utilized in the development of a fuel modification plan (not included in this document) are included in Appendix M. The fuel modification plan provides direction for installing and maintaining the fuel modification areas maintained by the Habitat Authority, as required by the LACFD for fire protection.

- **Maintain fuel modification areas to:**
 - Comply with the most current LACFD Fuel Modification Plan Guidelines (Appendix M) and City of La Habra Heights Guidelines
 - Establish the maximum vegetation cover allowed by the LACFD guidelines that provides habitat for native animal species and that reduces the edge effect to the Preserve
 - Where a conflict with the Mission of the Habitat Authority occurs, have a mandatory meeting to confer or explore alternate methods
- **Implement fuel modification within the required fuel modification zone as defined by LACFD using the following guidelines as appropriate and where reasonable:**
 - Use plant species in the required fuel modification zones that are native to the Preserve and compatible with the adjacent native habitat
 - Remove highly invasive exotic plant species, including enough of the root mass to prevent resprouting and dissemination of seeds to other parts of the Preserve
 - Remove other native species not allowed within the fuel modification zone, including enough of the root to prevent resprouting
 - Install plants and seed according to the installation technique described in the restoration section; refer to LACFD Fuel Modification Plan Guidelines to determine the allowed spacing
 - Thin and maintain the fuel modification area according to the most current LACFD Fuel Modification Plan Guidelines
 - Explore opportunities to work with fire management agencies to develop exceptions from the existing Fuel Modification Plan Guidelines when sensitive resources are present

Fire Management Plan. Historically, fires are a natural occurrence within the native plant communities of the Preserve. Fire in a natural system plays an important role in maintaining biodiversity by reducing dense vegetation and thatch buildup, allowing younger healthier growth, and promoting the germination of native forbs and grasses. Some native shrubs and trees recover quickly by “crown-sprouting,” a process whereby buds in the root crown quickly sprout using the existing root systems. Some species perish in a fire, but can quickly recolonize a burned site via seeds, while other species are termed “fire followers” and are typically observed in the first few to several years after a fire. Fire ash provides nutrients that assist in the regrowth of plants and allows seeds stored in

the soil to germinate. Seeds germinate and establish quickly with increased access to sunlight and increased soil nutrients from fire ash.

For reasons not completely understood, some native vegetation stands are suddenly “type-converted” to nonnative vegetation after a fire. These exotic vegetation communities can still be colonized by native species, but some exotic communities have been observed to be quite stable and resistant to colonization by natives. The potential presence of a nonnative seed bank within large areas of the Preserve poses a threat to recovery of desired native habitats and biodiversity following fires. Prescribed burns attempted in the Preserve by the LACFD in 1998 and 1999 resulted in the colonization of nonnative exotic species over native species in the burned areas. Other prescribed burns have not since been attempted.

The Puente Hills have been subjected to repeated wildfires. Over the years, several large (over 800 acres) fires have occurred within the Preserve boundaries, most notably the Hacienda No. 162 fire (1945), the Catalina fire (1979), and the Turnbull fire (1989).

For existing and proposed developments in the unincorporated areas, both the City of La Habra Heights Fire Department and the LACFD are active in insuring that effective fuel modification zones are established and maintained along the urban/wildland interface.

A fire management plan should be prepared for the Preserve by working with appropriate agencies such as CDFG, USFWS, and county and city fire departments. The plan should address all aspects of wildfire planning, including prevention, presuppression, and suppression.

- **Prepare a fire management plan (not a part of this document) for the Preserve to include the following:**
 - Summary of natural resources (topography, climate, hydrology, geology, soils, vegetation, and wildlife)
 - Assessment of fuel load, the fuel characteristics for each vegetative community (measuring tree canopy crown height, shrub crown height, litter depth)
 - Description of fuel characteristics used to assess the potential fire behavior in each vegetation community and determine the fire risk from existing fuel levels
 - Documentation of management alternatives (proposed action, no action, mechanical treatment, manual treatment, chemical, grazing)
 - Discussion of the natural and historic role of fire, the existing fire environment, ecological effects of fire
 - Development of a fire program that details prevention and suppression tactics by fire management units with priorities, treatment schedule, and exclusion zones
 - Discussion of the treatment constraints such as air quality and smoke management, wildlife, geologically sensitive areas, aesthetics, and public safety
 - Discussion of fire response readiness

- Description of the urban-wildland interface, including local regulations for fire protection for homes adjacent to the Preserve (Appendix M contains management suggestions for open space neighbors)
- Description of community relations and public education
- **Implement fire control methods that cause the least damage to natural resources while still protecting life and property.**
- **Continue existing fire prevention methods required by the City of La Habra Heights and LACFD at the urban-wildland interface to protect human life and properties surrounding the Preserve.**
- **Work with county and city planners to include fuel modification zones associated with future adjacent private development projects to be contained within the project footprint of the proposed project rather than within the Preserve.**
- **Prior to development of a long-term fire management plan, the following interim fire management policies should apply:**
 - Generally restrict use of bulldozers or other land-altering equipment to the widening and improvement of existing (access) roads.
 - Use hand crews to maintain firebreaks.
 - Consider backfiring from existing (access) roads, natural (features), trails (or fuel breaks) as preferable to constructing new fire control lines and other means of suppression.
 - Use natural features such as ridgelines along with roads for containment lines; maintain these areas regularly to maximize their effectiveness and minimize vehicle intrusion during fire suppression.
 - Use water saturation as a mop-up technique rather than digging out and stirring hot spots in areas with significant resources and in areas subject to significant postfire erosion.

6.2.3 Biological Monitoring

Monitoring and targeted studies for the Preserve should be designed to assist management decision-making. Under this model, management would move forward in a scientifically-based way that involves monitoring, conducting targeted studies, and applying management activities as experimental treatments. The results would feed back into decision-making, thus reducing uncertainty and improving the effectiveness of the program through time.

The Habitat Authority will use the best available information to make management decisions and also seek opportunities to learn how to better accomplish the Goals and Objectives of the RMP. Steps that may be involved in a long-term adaptive implementation program include opportunistic learning, hypothesis testing, management, monitoring, and directing the results of analysis and assessment back into the program through decision-makers. The existing biological inventory, direct observation, and empirical information are expected to inform the strategy for implementing the RMP's Goals and Objectives. Ideally, this process includes the following considerations: the creation of simple conceptual models of how the ecosystem functions or of a species' life history (models can also help

to define specific goals) and the use of the conceptual model to identify management questions, management activities, and monitoring.

Conceptual models summarize our current understanding of ecosystem or community function, or species life history, clarifying likely responses to management actions and pressures (i.e., stressors, causes of change). The conceptual models of ecosystem function and species life history will also drive development of the management and monitoring programs.

The Habitat Authority will use conservation models designed to preserve habitats for a variety of species such as Natural Communities Conservation Plans (NCCPs) or Habitat Conservation Plans (HCPs) in the region. These conceptual models will be adapted to the Preserve's site-specific needs, especially for urban edge issues.

Problem-focused conceptual models that link RMP objectives to causes of change and management activities are necessary for effective management and monitoring. Monitoring allows the Habitat Authority to measure resource condition and responses of the resource to anthropomorphic and natural perturbations. Ideally, monitoring can identify problems early so that corrective management action can be taken as soon as it is needed. In contrast, targeted studies (at small spatial scales or in pilot studies) may be more appropriately used to resolve critical questions regarding ecosystem functioning or management applications. While some management activities may have little uncertainty regarding application or outcomes (e.g., trash removal or sign posting), other management activities have much greater uncertainty (e.g., habitat restoration). Such activities should be designed as experiments to increase our understanding of the system and the effectiveness of management (e.g., determining the most effective way to control exotic species).

The results from monitoring and targeted studies will be evaluated and used to refine goals and conceptual models, improve the management program for the Preserve, and refine monitoring methods.

Inventory Resources And Identifying Relationships (Phase 1). The main goal of Phase 1 is to determine the baseline condition of the system as a prelude to long-term monitoring program design. This generally involves an inventory of what species, habitats, and other resources are present, their locations, and general conditions. Much of this work has been done in support of preparation of the RMP. However, new acquisitions will likely require new inventories, and some areas of the Preserve may have data gaps that will warrant new studies. Future inventory needs should be identified by the Habitat Authority.

Some management can be applied during this phase. In general, management should be limited to actions of known impact, such as hand-removal of weeds or fence construction to prevent vehicular access or maintaining existing habitat management until such management can be appropriately evaluated. This phase can also be used to develop or test hypothesized relationships between species, habitats, processes, and other causes of variation such as roads or invasive species. Simple conceptual models will be developed for key habitats and species, focusing on stressor relationships. Management questions will be developed with the goal of transforming management questions into long-term monitoring protocols.

Pilot Testing of Long-term Monitoring and Resolving Critical Management Uncertainties (Phase 2). Phase 2 is characterized by pilot testing of long-term monitoring protocols and sampling designs to select cost-effective designs with the ability to detect biologically relevant and management-relevant changes. This process of designing pilot monitoring protocols may be as simple as determining locations for photographic point monitoring or may require the development of a scientific sampling design with adequate statistical power to detect change. In addition, the pilot phase is an opportunity to conduct targeted studies to resolve critical management uncertainties and refine conceptual models based on emerging information.

- **Inventory sensitive species on a regular basis to keep track of the current status of the species within the Preserve.** Populations of sensitive plant species should be inventoried every year in the spring to identify status, health, threats, problems, and the trend of the populations. Every 5 years, suitable habitat in other areas of the Preserve should be surveyed during the spring for the presence of sensitive plant species. The coastal California gnatcatcher should be surveyed (by a permitted biologist) periodically to track the population and distribution of the species on the Preserve and to determine whether this threatened species is utilizing restored coastal sage scrub. Survey frequency should be determined by management need. A list of sensitive species observed within the Preserve can be found in Appendix I. Table H provides potential survey frequency information for species of interest located within the Preserve. To the extent possible, these studies should be conducted by staff.
- **Update vegetation maps every 5 years.** This update would include new acquisitions, habitat restoration projects, and mapping post-fire vegetation. It is important to have updated maps for Preserve management and planning. During the vegetation mapping effort, the invasive plant species discussed previously should be mapped to determine whether control of these populations should be considered a priority within certain areas of the Preserve.
- **Design and implement a study to track the trends and changes in the habitat types and quality.** This study will enable the Habitat Authority to monitor the status of the Preserve and shift priorities and management methods to achieve the goals of the Preserve. The study should be conducted at the same time each year in order to make consistent comparisons over time. Spring would allow for easier identification of the habitats and species. This will consist of setting up photo stations in various vegetation communities and tracking from year to year.
- **Perform pilot restoration experiments utilizing different techniques to determine the most cost-effective methods for the habitats of the Preserve.** Detailed methods for restoration are provided in the Habitat Restoration Plan, Appendix N. Site-specific restoration plans will be developed on an as-needed basis.
- **Conduct periodic wildlife monitoring to determine the health, quality, and functionality of different portions of the Preserve.** All of the activities scheduled in Table H apply to this task. To the extent possible, all data should be collected for individual watersheds to allow for better comparison and tracking. General wildlife surveys (e.g., butterflies or birds) should be conducted every 2 years, and bat and rodent surveys should be conducted every 5 years. Pitfall surveys should be conducted every 10 years. New surveys for ephemeral pool species (including the spadefoot toad) and general invertebrate species (primarily insects) are recommended every 5 years. Wildlife movement studies also should be conducted every 5 years to confirm the movement of animals across or through the Preserve. Close monitoring of the results of these investigations will allow Preserve managers to redirect or focus additional studies or actions to.

Table H: Proposed Monitoring Schedule for Preserve Species of Interest

Species	Description	Activity/Blooming Period	Monitoring Schedule	Potential Threats/Stressors	Potential Corrective Actions
Vascular Plants					
Southern California black walnut <i>Juglans californica</i> var. <i>californica</i>	Map distribution and monitor general health of trees	Year-round	Every 5 years	Frequent fires and the presence of highly invasive weeds like milk thistle, star thistle, and bull thistle could cause a reduction in germination of new walnuts.	Weed area for the highly invasive nonnative plant species and monitor for natural recruitment.
Plummer's mariposa lily <i>Calochortus plummerae</i>	Survey existing populations annually and survey for new populations every 5 years	May–July	Annually	Encroachment by highly invasive nonnative plants and successional changes in the native habitat to a denser native cover.	Weed area for highly invasive nonnative plant species and, on a limited basis, thin the native vegetation to reduce the amount of succession.
Catalina mariposa lily <i>Calochortus catalinae</i>					
Robinson's pepper grass <i>Lepidium virginicum</i> var. <i>robinsonii</i>					
Many-stemmed dudleya <i>Dudleya multicaulis</i>	Suitable habitat should be surveyed for presence within the Preserve	May–July	Every 5 years	Encroachment by highly invasive nonnative plants and successional changes in the native habitat to a denser native cover. Foot traffic is also a threat.	Weed area for highly invasive nonnative plant species and, on a limited basis, thin the native vegetation to reduce the amount of succession. Reduce foot traffic in potential habitat areas.
General Wildlife					
Ephemeral pool species [including invertebrates and western spadefoot (<i>Spea hammondi</i>).]	Helicopter surveys for pools followed by direct surveys of selected pools	Spring	Approximately every 5 years, but targeting above average rain years is more important	Pool degradation from events such as excessive disturbance, pollution, changes in drainage patterns, drought, and colonization by exotic plant or animal species.	Restrict access to pool areas; control flows from pollution sources; reconfigure existing pools or construct new pools; provide water for ponding; and eliminate exotic species.
Wildlife species Focused primarily on butterflies, herpetiles, birds, and diurnal mammals.	Drainage-based all-Preserve surveys, as conducted in 2005	Spring and winter	Every 2 years	Habitat degradation from events such as fragmentation, fire, excessive disturbance (including fuel modification), pollution, drought, colonization and incursions by exotic plant or animal species, and placement of structures restricting free flight for resident or migratory species.	Purchase critical properties to maintain habitat continuity; increase abundance of certain plant species or habitats important for various reasons; monitor fire frequency and other patterns of disturbance; control flows from water pollution sources and report air pollution impacts; restrict access to or eliminate exotic species; and remove or relocate structures restricting free flight.

Table H: Proposed Monitoring Schedule for Preserve Species of Interest

Species	Description	Activity/Blooming Period	Monitoring Schedule	Potential Threats/Stressors	Potential Corrective Actions
Wildlife species Focused primarily on herpetiles and small mammals.	Preserve-wide pit-fall trapping	Spring	Every 10 years	Habitat degradation from events such as fragmentation, fire, excessive disturbance (including fuel modification), pollution, drought, colonization and incursions by exotic plant or animal species.	Purchase critical properties to maintain habitat continuity; increase abundance of certain plant species or habitats important for various reasons; monitor fire frequency and other patterns of disturbance; control flows from water pollution sources and report air pollution impacts; and restrict access to or eliminate exotic species.
Invertebrates					
Invertebrates (primarily insects) See also the three general wildlife surveys above.	Preserve-wide terrestrial and aquatic invertebrate surveys using standardized techniques	Spring/summer	Every 5 years	Habitat degradation (particularly affecting food plants and places where eggs are laid) from events such as fragmentation, fire, excessive disturbance (including fuel modification), pollution, drought, and colonization by exotic plant or animal species.	Purchase critical properties to maintain habitat continuity; increase abundance of certain plant species or habitats important as larval food or nectar sources; monitor fire frequency and other patterns of disturbance; control flows from water pollution sources and report air pollution impacts; and eliminate exotic species.
Sensitive invertebrate species	See previous and three general wildlife surveys above.				
Amphibians					
Western spadefoot <i>Spea hammondi</i>	See ephemeral pool species and wildlife species (pit-fall trapping) under General Wildlife above.				
Reptiles					
Sensitive reptile species	See general wildlife surveys above. Based upon the results of the general surveys, added emphasis may be placed on certain habitats or species.				

Table H: Proposed Monitoring Schedule for Preserve Species of Interest

Species	Description	Activity/Blooming Period	Monitoring Schedule	Potential Threats/Stressors	Potential Corrective Actions
Birds					
Coastal California gnatcatcher <i>Polioptila californica californica</i>	Survey existing territories every 2 years to determine if still present and or expanding	Year-round	Every 2 years	Habitat degradation of coastal sage scrub.	Purchase critical properties to maintain sufficient amounts of coastal sage scrub; and create additional coastal sage scrub through restoration efforts.
Sensitive bird species	See general wildlife surveys above. Based upon the results of general surveys, added emphasis may be placed on certain habitats, species, or species groups (e.g., raptors).				
Cooper Group I⁷ Species identified by D.S. Cooper ¹ as requiring large blocks of habitat (California quail, white-tailed kite, northern harrier, greater roadrunner).	See general wildlife surveys above.			Habitat fragmentation.	Purchase critical properties to maintain habitat continuity for grassland, brushland, and woodland; create additional grassland, brushland, and woodland through restoration efforts.
Cooper Group II Species identified by D.S. Cooper as requiring somewhat fragile habitat (cactus wren, coastal California gnatcatcher, least Bell's vireo, grasshopper sparrow).	See general wildlife surveys and coastal California gnatcatcher above.			Habitat degradation of cactus scrub, coastal sage scrub, riparian scrub, and grassland.	Purchase critical properties to maintain sufficient amounts of cactus scrub, coastal sage scrub, riparian scrub, and grassland; and create additional cactus scrub, coastal sage scrub, riparian scrub, and grassland through restoration efforts.
Cooper Group III Species identified by D.S. Cooper as requiring robust examples of coastal sage scrub (cactus wren, coastal California gnatcatcher, Costa's hummingbird).	See general wildlife surveys and coastal California gnatcatcher above.			Habitat degradation of coastal sage scrub.	Purchase critical properties to maintain sufficient amounts of coastal sage scrub and create additional coastal sage scrub through restoration efforts.
Cooper Group IV Species identified by D.S. Cooper as requiring robust examples of oak woodland (oak titmouse, Hutton's vireo).	See general wildlife surveys above.			Habitat degradation of oak woodland.	Purchase critical properties to maintain sufficient amounts of oak woodland and create additional oak woodland through restoration efforts.

⁷ Cooper, D. S. 2000. *Breeding Land Birds of a Highly Threatened Open Space: the Puente-Chino Hills, California*. Western Birds. Vol. 31, No. 4, pp. 213–234.

Table H: Proposed Monitoring Schedule for Preserve Species of Interest

Species	Description	Activity/Blooming Period	Monitoring Schedule	Potential Threats/Stressors	Potential Corrective Actions
Cooper Group V Species identified by D.S. Cooper as requiring robust examples of riparian woodland for breeding (northern flicker, western wood-pewee, warbling vireo).	See general wildlife surveys above.			Habitat degradation of riparian woodland.	Purchase critical properties to maintain sufficient amounts of riparian woodland and create additional riparian woodland through restoration efforts.
Cooper Group VI Species identified by D.S. Cooper as requiring robust examples of riparian scrub (least Bell's vireo, yellow-breasted chat).	See general wildlife surveys above.			Habitat degradation of riparian scrub.	Purchase critical properties to maintain sufficient amounts of riparian scrub and create additional riparian scrub through restoration efforts.
Cooper Group VII Species identified by D.S. Cooper as requiring robust examples of grassland (grasshopper sparrow, western meadowlark).	See general wildlife surveys above.			Habitat degradation of grassland.	Purchase critical properties to maintain sufficient amounts of grassland and create additional grassland through restoration efforts.
Cooper Group VIII Species identified by D.S. Cooper as having declined alarmingly in the Los Angeles area (burrowing owl, loggerhead shrike, cactus wren, coastal California gnatcatcher).	See general wildlife surveys and coastal California gnatcatcher above.			Continued regional declines and habitat degradation of grassland and coastal sage scrub.	Participate in regional conservation plans for these species, possibly including reintroduction efforts; purchase critical properties to maintain sufficient amounts of grassland and coastal sage scrub; and create additional grassland and coastal sage scrub through restoration efforts.
Mammals					
Bats See also the general wildlife surveys above.	General surveys comparable to those conducted in 2004/2005; added emphasis may be placed on certain species	Year-round	Every 5 years	Habitat degradation from events such as fragmentation, fire, excessive disturbance (particularly at roosting and foraging sites), pollution, drought, colonization by exotic species, and placement of structures restricting free flight for resident or migratory species.	Purchase critical properties to maintain habitat continuity; increase abundance of certain plant species or habitats important for various reasons; monitor fire frequency and other patterns of disturbance; protect existing roosting and foraging sites and create additional sites suitable for roosting; control flows from water pollution sources and report air pollution impacts; eliminate exotic species; and remove or relocate structures restricting free flight.

Table H: Proposed Monitoring Schedule for Preserve Species of Interest

Species	Description	Activity/Blooming Period	Monitoring Schedule	Potential Threats/Stressors	Potential Corrective Actions
<p>Rodents See also the general wildlife surveys above.</p>	<p>General surveys comparable to those conducted in 2005; added emphasis may be placed on certain species</p>	<p>Year-round</p>	<p>Every 5 years</p>	<p>Habitat degradation from events such as fragmentation, fire, excessive disturbance (including fuel modification), pollution, drought, and colonization and incursions by exotic plant or animal species.</p>	<p>Purchase critical properties to maintain habitat continuity; increase abundance of certain plant species or habitats important for various reasons; monitor fire frequency and other patterns of disturbance; control flows from water pollution sources and report air pollution impacts; and restrict access to or eliminate exotic species.</p>
<p>Larger mammals See also the general wildlife surveys above.</p>	<p>Wildlife movement study, comparable to that done in 2005</p>	<p>Year-round</p>	<p>Every 5 years</p>	<p>Habitat fragmentation and habitat degradation from events such as fragmentation, fire, excessive disturbance (including fuel modification), pollution, drought, and colonization and incursions by exotic plant or animal species.</p>	<p>Purchase critical properties to maintain habitat continuity; increase abundance of certain plant species or habitats important for various reasons; monitor fire frequency and other patterns of disturbance; control flows from water pollution sources and report air pollution impacts; and restrict access to or eliminate exotic species.</p>

address specific conservation or restoration needs as they are identified. Flexibility and responsiveness to changing situations will be critical to the success of this effort. Proactive monitoring and management programs conducted within the Preserve will play a vital role in the conservation of natural resources within the region

- **Periodically reassess the presence of nonnative and other pest animal species to determine their effect on the Preserve. The Habitat Authority should document and track the occurrences of European starlings, brown-headed cowbirds, and Argentine ants during general wildlife surveys. As new invasive animal species are observed or reported, the Habitat Authority will determine the number, along with impacts to the Preserve.**
- **Provide opportunities for university-level research, especially in cases where research would help to answer fundamental management questions or contribute to the conceptual models of species of interest and habitats.** Work with university researchers and graduate students to develop projects that would provide useful information to the Habitat Authority. Research proposals would be evaluated on a case-by-case basis in consideration of potential impacts associated with the research.

Implementation of Long-Term Monitoring and Adaptive Management (Phase 3). Activities include implementation of long-term monitoring protocols and periodic evaluation and refinement of the monitoring program. The program continues to address uncertainties, principally by evaluating responses to management and extreme events. Emerging uncertainties are also addressed and prioritized, such as a new invasive species or pollution sources.

6.2.4 Biological Resource Data Keeping

The Habitat Authority should maintain a database and maps of plant and animal species observed in the Preserve by Authority personnel and by other resource agencies and the public. The geographical information system (GIS) created as part of the RMP will provide the means to accomplish this intent. The Habitat Authority should share spatial and/or resource data as appropriate with statewide data warehouses such as BIOS.

- **Regularly update the GIS database by expanding the layers associated with special status plants and animals and invasive exotic plant infestations.** Incorporate new observations from Preserve personnel and from such sources as the CNDDDB, the USFWS, Audubon Society bird counts, and studies conducted under CEQA/NEPA documentation for projects near the Preserve. Standard protocols would help to facilitate ongoing observations and monitoring using global positioning system (GPS). The use of a data dictionary to store images and other data should be incorporated into the GIS database.
- **Facilitate long-term habitat restoration and management efforts in the Preserve, particularly with regard to special status biota and invasive exotic species by maintaining current data in the GIS system for each layer.** Include the following key attributes in the GIS database for each community:

Vegetation Attributes	Wildlife Attributes
Dominant overstory plant species Dominant understory plant species Dominant ground cover Common plant species Observed special status plant species Potential special status plant species Invasive exotic plant species Typical overstory density Typical understory density Typical ground cover density	Common animal species Observed special status animal species Observed exotic species Introduced animal species Observed roosting, nesting, and burrowing sites Other notable species Special habitat features

6.2.5 Habitat Enhancement and Restoration

The purpose of the Habitat Restoration Plan (Appendix N) is to provide guidance on restoring degraded and disturbed habitats throughout the Preserve. Large areas of degraded habitat have been infiltrated by invasive weeds. Restoration of important and sensitive habitat resources, including wetlands, riparian areas, and wildlife corridors, is essential.

While the Habitat Restoration Plan provides a great deal of technical information on existing conditions within the Preserve and on restoration methods, it is programmatic in nature and accomplishes the following:

- Identifies the range of conditions that exist in the potential restoration areas, specifically soil characteristics and weed composition;
- Provides restoration criteria and a priority evaluation on restoring the degraded and disturbed habitats;
- Provides information on the most effective restoration methods currently known and their associated costs;
- Provides basic data and recommended prescription for restoration methods for each type of potential restoration area;
- Provides guidelines for preparing more detailed, site-specific plans that will maximize the success and minimize the cost of individual restoration efforts; and
- Provides guidance for approving future mitigation projects in the Preserve.

The Habitat Restoration Plan is organized by the analyses of existing conditions (e.g., soil, slope, and exotic species), restoration criteria and priority, restoration application, restoration techniques, planting and seeding palettes, and performance standards and monitoring.

The Habitat Restoration Plan considers all of the available baseline resources, cultural resources data, and input from the Habitat Authority to make sure that the tenets of Ecosystem Management are incorporated. The Habitat Restoration Plan utilizes restoration criteria for priorities with a master list of techniques and situations for which they are appropriate. The restoration areas are evaluated for

site conditions; recommendations of appropriate restoration techniques are prescribed for each type of restoration area. The Habitat Restoration Plan may be modified based on monitoring results.

- **Develop specific plans for individual restoration sites, using the information and guidelines provided in the Habitat Restoration Plan as well as new information developed through adaptive management.** It will be important to consult with an experienced restoration ecologist when preparing the individual specific restoration plans.
- **Assess, control, manage, and eradicate invasive exotic species as appropriate and needed to protect Preserve resources in accordance with the guidelines contained in Appendix N.**

6.2.6 Exotic Plant Control

The following exotic plant species are of primary concern for control or eradication. Some locations were mapped during the 2004 and 2005 surveys (Figure 6). Other exotic plant species observed but not mapped are included in Appendix E. The primary objective in exotic plant control in the Preserve is to reduce the abundance of invasive species, particularly around populations of sensitive plants and in riparian areas. Control can be a combination of using mechanical and chemical methods.

Appendix N provides details of the biology, threat level, and management options for selected exotic plant species. Continued monitoring of exotic species populations, abundance, and locations will assist in determining the most appropriate management options. The Habitat Authority will develop site-specific measures for physical, biological, and chemical control; such measures are described further in *Invasive Plants of California's Wildlands* (Bossard et al. 2000).

- **Eradicate tamarisk (*Tamarix* sp.) from La Cañada Verde Canyon and other drainages.** The current infestation on the Preserve is small and occurs within primarily native habitat. For these reasons, either digging or pulling plants or cutting the stems and applying herbicide will best accomplish tamarisk control on the Preserve. Resprouts should be retreated within 4 to 12 months of the initial treatment. Large mechanized equipment should not be used, as it may disturb the surrounding native habitat.
- **Eradicate pampas grass (*Cortaderia selloana*) from the Preserve.** Pampas grass is located along the edges of the Preserve and within some of the drainages. This species also occurs off site, where it has been planted as ornamental landscaping in adjacent residential developments. Pampas grass has the potential to expand its distribution due to its airborne seed dispersal mechanism, the presence of a seed source in the vicinity, and the network of roads, trails, and other bare soil areas on the Preserve. Pampas grass has been effectively controlled through both physical and chemical methods. Flowering stalks should be bagged prior to removal to prevent seed dispersal.
- **Where reasonable and appropriate, remove eucalyptus (*Eucalyptus* sp.) trees from the Preserve.** The large mature eucalyptus trees should be removed once a thorough raptor survey is completed and the nesting trees are located. The nesting trees should not be removed in order to maintain existing nesting sites for raptors. In many cases, site-appropriate native trees (e.g., oaks, sycamores, and walnuts) will be planted to compensate for the loss of eucalyptus. All young eucalyptus saplings should be removed throughout the Preserve to prevent their spread. Eucalyptus trees will be removed through either physical or chemical methods or a combination of both.

- **Eradicate fountain grass (*Pennisetum setaceum*) from the Preserve.** Small stands of fountain grass may be a threat to populations of sensitive plant species. Hand removal would be an appropriate management tool for most stands of fountain grass. Hand removal would likely need to be used in conjunction with native plant restoration to reduce subsequent colonization opportunities for the fountain grass and other exotics. Long-term monitoring of the Preserve will be required to ensure that new infestations are controlled at an early stage because of the potential for seed longevity in the soil and offsite propagule sources in proximity to the Preserve.
- **Manage Italian thistle (*Carduus pycnocephalus*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), and milk thistle (*Silybum marianum*) at levels that do not threaten sensitive species and their habitat.** These thistles are best controlled through monitoring and spot eradication in critical areas prior to widespread infestations. The use of herbicides has been highly effective in these cases, especially along trails. Chemical control would be more efficient than mechanical control with typically less resprouting using herbicide than with mechanical cutting. Where chemical control is not possible (e.g., when using volunteers who are not trained in the safe use of herbicides), weed whips, brush cutters, loppers, or hoes can be used to cut the weeds as close to the ground as possible. Control efforts should be weekly or biweekly because some plants will resprout from below ground root, and many of these plants have seeds that germinate over a long period of time. During the blooming season, weekly visits are important to prevent any plants from setting seed. If mature seed heads are encountered, they should be bagged, then cut and disposed of in the trash.

Mowing is probably more appropriate along flat to slightly sloping hills, where the thistles may occur in great numbers. Plants should be cut below the lowest branches when the population has just started to bloom. If plants are cut too early, regrowth, flowering, and seed production may occur.

- **Remove individual myoporum (*Myoporum laetum*), Peruvian pepper (*Schinus molle*), black locust (*Robinia pseudoacacia*), Brazilian pepper (*Schinus terebinthifolius*), and other exotic trees present throughout the Preserve.** These trees should be removed by mechanical or chemical methods, or a combination of the two. Removal should be outside the nesting bird season, or individual trees will be checked for active nests prior to removal.
- **Manage fennel (*Foeniculum vulgare*), castor bean (*Ricinus communis*), and poison hemlock (*Conium maculatum*).** Large infestations of these plants exist throughout the Preserve. These plants can be controlled by cutting the stems and applying herbicide or spraying small plants with herbicide. Retreat any resprouts within 4 to 12 months of the initial treatment. Large mechanized equipment that may disturb native habitat should not be used.
- **On an annual basis, map new stands of exotic species and prioritize them for treatment.** See Appendix E for a list of exotic species observed at Puente Hills. Most of these are included on the CalIPC list as exotic pest plants of greatest ecological concern in California.

6.2.7 Seed Collection and Storage

- **Develop a seed collection program for some of the sensitive species located within the Preserve to ensure that the genetic diversity of the on-site populations is not lost as a result of fire, habitat degradation, or other catastrophic events.** Collect seed in conjunction with other management measures to maintain or improve habitat quality and in a manner that does not

impact existing populations. Seed should be collected from a percentage of all populations on the property in order to preserve the full genetic spectrum. A take authorization will be necessary for the collection of seed from listed species if such species are found within the Preserve in the future. See Appendix N for protocols for seed collection, storage, and propagation.

- **Store collected seed in a recognized seed collection facility. Seed from distinct populations should be stored separately.** Seed should be available for post-burn seeding, enhancement, or reintroduction efforts, as determined necessary. Seed should be used for restoration within three years of collection.
- **Collect seed from within the Preserve for restoration efforts, wherever feasible.** All shrub species and herbaceous species used in the restoration efforts will offset impacts from the exotic species present within the Preserve. With proper planning efforts, seed collection should be initiated 1–2 years in advance of the restoration to allow for the collection of seed from species that flower at different times throughout the year.

6.2.8 Exotic Animal Control

The presence of exotic species is inconsistent with the goals of maintaining native species and natural systems. Dogs and cats and other domesticated animals that live near the Preserve are potential predators to native species.

- **Continue to educate homeowners and Preserve visitors about keeping pets indoors at night and keeping pet food indoors or in a secure location that does not attract wildlife from the Preserve.**
- **Continue to enforce existing Preserve rules and regulations regarding dogs.** When hiking with dogs at the Preserve, owners are required to keep dogs on leash, stay on trails, and pick up after them.
- **Identify and control, to the extent possible, Argentine ants.**

6.2.9 Wildlife Corridor Maintenance

In the July 2005 study titled *Maintaining Ecological Connectivity Across the “Missing Middle” of the Puente-Chino Hills Wildlife Corridor*, the CBI suggested wildlife crossing improvements to address corridors in the Preserve. The following recommendations are adapted from those suggestions:

- **Harbor Boulevard.** Maximize the effectiveness of the wildlife tunnel by actions such as acquiring the rights to install fencing along both sides of the tunnel to direct wildlife and by planting vegetation on either side to provide cover to wildlife. Maintain integrity of the tunnel with periodic maintenance. Also, explore other alternative measures to avoid, minimize, or reduce wildlife roadkill.
- **Hacienda Boulevard.** Add wing fencing and screening vegetation on the western end to help guide wildlife into the existing equestrian tunnel and provide cover. Consider ways by which to enlarge the tunnel to increase wildlife usage. Consider the construction of a wildlife overpass (a vegetated wildlife bridge) over the road to utilize the steep slopes on either side. Strive to acquire

parcels in the narrow, constricted portion of the corridor between Powder Canyon and Hacienda Boulevard. Explore other alternative measures to avoid, minimize, or reduce wildlife roadkill.

- **Colima Road.** Add screening vegetation around the Colima Service Tunnel and limit disturbances in the vicinity of the tunnel (e.g., artificial lighting or recreation uses) between sunset and sunrise, when wildlife utilizes this corridor the most. Consider the construction of a wildlife overpass (a vegetated wildlife bridge) over the road to utilize the steep slopes on either side. Explore other alternative measures to avoid, minimize, or reduce wildlife roadkill.
- **Promote other road crossing facilities for wildlife throughout the Preserve when feasible and where appropriate.** Explore other alternative measures to avoid, minimize, or reduce wildlife roadkill.

6.3 CULTURAL RESOURCES MANAGEMENT

The overall goal of the RMP is to present a comprehensive, long-term management plan for the Preserve. In dealing with any potential cultural resources located within the Preserve, the principal fundamental objective is the identification of the best way to manage, protect, and enhance Preserve resources while still providing educational opportunities to the public as well as a safe recreational environment. Recommended management actions for cultural and paleontological resources within the Preserve are described below.

6.3.1 Cultural Resources Management Actions

- **Conduct a search of the Native American Heritage Commission (NAHC) Sacred Lands files in order to identify Traditional Cultural Areas within the Preserve.** Native American groups should be appropriately consulted by Preserve management personnel in identifying sacred sites and natural resources procurement areas and to help develop management programs for these resources. (PRC Section 5097.9)
- **For any cultural resource work conducted within the Preserve, a Los Angeles County certified archaeologist should prepare a Research Design that identifies research strategies to be implemented during the research program.** A review team of cultural resource professionals should establish research priorities for the Preserve, and cultural resource work within the Preserve should be designed to address these priorities.
- **Create a cultural resources interpretive display to help disseminate information about the Whittier Oil Field remains to the public.**
- **Monitoring of any project that involves earth-disturbing activities in culturally rich soils should be conducted by a trained archaeologist under the supervision of a Los Angeles County Certified Archaeologist.** Artifacts that are unearthed during this construction should be collected with provenience information when available (PRC Section 21083.2[c]).
- **When sites and/or isolates are located, they should be recorded on California Department of Parks and Recreation (DPR) 523 series forms.** Location data should be recorded using a handheld GPS unit. Site updates, including photos and maps, should be completed for previously documented sites that are reevaluated. Surface collection is recommended for any materials

encountered if the site appears to be threatened by natural or human factors (PRC Section 5020.4).

- **When the significance of a site is unknown, a Los Angeles County certified archaeologist should conduct test excavations at those sites to determine if they are eligible for listing on the National Register and/or the California Register.** The archaeologist shall provide recommendations for further action based on the findings of test-level excavations (PRC Section 5020.1; PRC Section 21083.2; and California Code of Regulations, Title 14, Chapter 2, Section 15064.5).
- **Implement an emergency response plan for sites that have been exposed by erosion.** When cultural resources, including artifacts or features, are encountered, either during a planned patrol or in another unexpected manner, a Los Angeles County certified archaeologist should be consulted. The certified archaeologist will both recommend and, with Habitat Authority approval, implement mitigation measures that are appropriate for the impacts to the sites (Section 110 of the National Historic Preservation Act [NHPA]).
- **Presence/absence archaeological surveys are considered to have a 5-year lifetime.** A Preserve-wide systematic reconnaissance survey should be conducted every 5 years under the direction of a Los Angeles County certified archaeologist. To help staff this endeavor, qualified volunteer groups could be utilized to assist in the survey of the Preserve. Update the Preserve-wide survey every five years, particularly in high visitation and high erosion areas.

6.3.2 Paleontological Resources Management Actions

- **Prior to any significant ground-disturbing activities within the Preserve, conduct a paleontological assessment survey** under the direction of a County-certified paleontologist to identify both the rock types present in the area and the potential for significant fossil resources to be discovered (PRC Section 5097.5).
- **If significant fossils are identified, they should be scientifically salvaged prior to initiation of construction activities.** A County-certified paleontologist should develop a Paleontological Resources Impact Mitigation Program (PRIMP) consistent with guidelines developed by the SVP (1995) to direct resource monitoring of excavations in order to collect and properly curate any fossils that may be discovered during the ground-disturbing activities.
- **When fossil localities are identified, they should be recorded on fossil locality sheets that will document important information about the find** such as a temporary field number, tentative identification of the find(s), description of the sediments, formation name, location of the find within the Preserve, elevation, and GPS locational information. Every effort should be made to preserve the site in situ for future generations. Collection is recommended for any materials encountered if the fossil appears to be threatened by natural or human factors.
- **Implement an emergency response plan for sites that have been exposed by erosion or planned Preserve maintenance.** When paleontological resources are encountered, a Los Angeles County certified paleontologist should be consulted. The certified paleontologist will recommend mitigation measures that are appropriate for the impacts to the locality.

6.4 PUBLIC USE

Public access must be secondary to the primary goal to protect and enhance the natural and cultural resources of the Preserve. Consistent with this purpose, a Trail Plan (described below) will be implemented to:

- Improve the proposed network of authorized trails and ensure that there are minimal impacts to natural resources;
- Close and restore unauthorized and other existing trails to native habitat;
- Evaluate the potential for new trail routes that provide loop opportunities and connections between other trails to prevent additional unauthorized trails from forming; and
- Initiate management actions to minimize road and trail impacts to the natural and cultural resources of the Preserve. (Road and trail maintenance activities are discussed in Section 6.5.2.)

A comprehensive interpretative program is the means to convey information about the Preserve and the nature of the land it was established to protect. Trail use lends itself to an active recreational experience that can be enhanced by educating trail users about the local environment and history. The Habitat Authority has initiated several interpretive displays and programs to convey information about the Preserve. A comprehensive Interpretive Plan should be developed for the Preserve that integrates new facilities, interpretive trails, interpretive displays, and public programs into the already existing framework of interpretive tools and activities that the Preserve employs.

6.4.1 Access and Trails

The comprehensive road network created by historical uses has provided a ready-made trail system to accommodate public use. However, it has also left the Preserve with a legacy of roads and trails that were not always constructed or maintained with sensitivity to the environment. The creation and ongoing use of approximately 6 miles of unauthorized trails destroys and fragments habitat and causes erosion. In particular, downhill mountain biking trails on steep hillsides exacerbate conditions that lead to erosion because they compact soils, remove ground cover, and concentrate runoff flows.

Given the primary intent of the Preserve, trails and public access are secondary to the primary goal of protecting habitat and resources. However, the Habitat Authority has committed to offering access and recreational opportunities to the public. The challenge for the Habitat Authority is to ensure that public access and recreational use are consistent with habitat protection. As such, the Habitat Authority will implement a Trail Plan that focuses on the following.

- Prioritizing resource protection
- Relocating or decommissioning trails if impacts on native habitat or other resources are discovered
- Locating new trails away from sensitive habitat areas
- Eliminating duplication of trails
- Reconstructing existing trails rather than rerouting the trail to minimize ground disturbance
- Providing diverse and interesting trail experiences to minimize unauthorized trail use

- Using best management practices in the design, construction, and maintenance of trails
- Formulating seasonal trail guidelines including possible rotation of access points to protect sensitive species from significant adverse user impacts during nesting season or other sensitive periods

There are an estimated 60 miles of roads and trails in the Preserve, including the Los Angeles County Schabarum Trail, authorized or permitted use trails, fire and utility access roads, and visitor-created unauthorized trails and shortcuts. Unauthorized trails contribute to erosion, habitat fragmentation, alteration of natural drainage patterns, introduction of exotic vegetation, degradation of native vegetation, and increased human-wildlife conflicts. To be consistent with the mission and intent of the Preserve, public access must be restricted in areas that are unsafe or inappropriate for users. Such areas include sites where conflicts with wildlife may occur, where conditions are degraded, and where it is necessary to minimize impacts to sensitive habitat for conservation or restoration. In addition, temporary closure of trails or other facilities may be necessary to effect a beneficial change in a significant habitat.

The Proposed Trail Plan focuses on recognizing a 46-mile trails network and closing and restoring approximately 16 miles of trail routes to protect natural resources in the Preserve, consistent with adequate funding and staffing. Of the 46 miles of new trails, about 25 miles are Habitat Authority trails and 21 miles are the County's Schabarum Trail. Of the estimated 6 miles of unauthorized trails in the Preserve, approximately 5 miles will be closed and restored to native habitat. Only a handful of unauthorized trails will be converted to authorized trails in order to provide loop opportunities for trail users. While establishing new trails is not a priority, the Habitat Authority is exploring the following enhancements to improve access and provide variety: a new loop trail near the Arroyo Pescadero access point at Colima Road, new trailhead facilities and a connector trail at Hadley Road near Worsham Canyon, a new trailhead facility and parking lot at Turnbull Canyon Road, and a connector trail in Turnbull Canyon northwest of Workman Hill. Figure 12 shows these proposed improvements and the proposed 46-mile trail network. The Trail Plan will also implement BMPs, design standards, and maintenance and management strategies for improving the proposed network of roads and trails and minimizing their impacts on natural resources (see Road and Trail Maintenance, Section 6.6.2).

Authorizing official trails and closing or abandoning selected trails within the Preserve and subsequently restoring these areas will improve the quality of habitat for wildlife and be consistent with the primary goal of resource protection. Trail decommissioning and restoration priority should be given to trails in the more biodiverse areas of the Preserve such as Sycamore and Turnbull Canyons (Figures 10a and 10b). Before restoration activities take place, closing may be accomplished by covering the trails with leaf litter and blocking them with physical barriers, or by posting signage and delivering citations as necessary to discontinue any additional human disturbance. Each trailhead in the Preserve should have an informational kiosk or sign that contains a map with the authorized trails; permitted user groups; a summary of the trail safety guidelines, rules and regulations; and a description of the benefits of using the designated system of roads and trails and the detriments of nonsystem trail use and construction. Refer to Section 6.6.2 for the specific trail management component of the Trail Plan.

6.4.2 Interpretive Themes

Interpretation provides the means to deepen an appreciation of the landholdings and to provide lasting benefits to individuals and the local communities. Interpretive services can introduce visitors to the intrinsic values of the property and educate about the appropriate management of natural and cultural resources.

The Habitat Authority contains intact native habitat and remnants of Southern California's historic landscape. Interpretation will include the significance of the historical use of the land, the local wildlife and their habitat still present, and the need for preservation of the land to instill in visitors the sense of place and stewardship. Visitors will also gain an understanding of how the Southern California agriculture and oil industry utilized and affected this property. Identifying these historic structures and locations to the visitors will enable them to learn the importance of preserving and protecting the cultural resources of the property.

- **Follow interpretive themes that establish the overall interpretive direction and tone, as outlined below.** Unifying themes provide overall focus to the Habitat Authority's interpretive development. The unifying theme must relate to the resources, the mission of the Habitat Authority, and the interests of visitors. Primary and supporting interpretive themes elaborate and further describe the unifying theme.

UNIFYING THEME: Natural forces, plants, animals, and people continually change the fragile habitat. Through conservation and sustainable practices, the Habitat Authority endeavors to provide permanent protection for the Preserve's resources.

Primary Theme: The Preserve contains a richly diverse collection of plant and animal species, all dependent on the native habitat.

- **Secondary Theme:** To preserve the biological diversity of the lands managed by the Habitat Authority, it is crucial that there be a biological corridor present to support exchange of genetic materials by the wildlife to other existing natural areas.
- **Secondary Theme:** Because of the urban edge effects to wildlife and the native habitat, it is important and beneficial to humans to learn coexistence techniques.
- **Secondary Theme:** Because of the diverse ecosystem present within the Preserve, recreational use must be balanced to provide long-term preservation.

Primary Theme: The Preserve contains landscape that is rich in both history and culture.

- **Secondary Theme:** Early indigenous peoples' traditional use of the natural resources and cultural harmony with the land give the people of today an insightful look into how to coexist with and care for the natural resources around them.

- **Secondary Theme:** Early explorers and settlers to the Preserve helped to shape the communities that are present today.
- **Secondary Theme:** Past agricultural practices and those of the oil industry helped shape the landscape as we see it today.

6.4.3 Interpretive Goals and Implementation Actions

Interpretive goals and guidelines provide the basis to prepare interpretive plans that expand upon the interpretive themes, and detail methods, media, and programs for the Habitat Authority. Specific project interpretive plans and exhibit plans that focus on more detailed interpretation may then follow in future documents. Three main goals are identified for the Habitat Authority's interpretive programs:

- Visitors will understand and appreciate the importance of Southern California's native habitats;
- Visitors will learn about and understand how humans both past and present have affected Southern California's native habitats; and
- Visitors will understand the need for ongoing protection and enhancement of the natural, cultural, and recreation resources for present and future generations.

To realize these goals, the following actions should be implemented when feasible:

- **Develop a Comprehensive Interpretive Plan for the Habitat Authority that reflects the unifying theme and primary themes outlined above.** The Plan should articulate strategies to implement the goals and objectives for interpretation, including new facilities, interpretive trails, interpretive displays, and interactive programming. The Plan should also enhance interpretive techniques for public programs, self-guided tours, brochures, maps, and school programs.
- **Align interpretive and educational programs for K-12 age groups with the California Department of Education's frameworks and content standards.**
- **Focus interpretation and educational efforts on developing stewardship practices among visitors, neighbors, and neighboring jurisdictions.** These elements could include urban edge effects, urban wildlife coexistence, wildfire risk and prevention, and trail safety.
- **Deliver interpretation and education using a wide range of methods including, but not limited to, brochures, signs, special events, and Web-based strategies.**
- **When feasible, use Habitat Authority staff and the expertise of other agencies and organizations and volunteers in developing and implementing Preserve interpretive and education programs.**
- **Create youth and adult educational, research, and interpretive opportunities.** Develop an ongoing relationship with local school districts, colleges, and universities.
- **Implement the following interpretive programs:**
 - Interpretive hikes based on existing themes for adults, families, or organized groups
 - Interpretive and educational lectures and events for the public and local communities
 - Interpretive and educational programs for K-12 students

- Volunteer and Docent training programs
- Community and wildlife coexistence programs
- **Continue the partnership with other agencies to support regional interpretive centers.**
- **Provide interpretive kiosks at key points within the Preserve.**
- **Develop a Visitor Center for the Preserve.**

6.4.4 Public Information

Given the location of the Preserve within two different cities and one large county, and the close proximity of many neighborhoods that abut the Preserve, the Habitat Authority must maintain strong community relations to ensure a positive visitor experience with minimal adverse impacts on neighbors to the Preserve. A number of both formal and informal partnerships already exist and provide for the continued exchange of information. Partnerships provide Preserve management and local community leaders the opportunity to meet the environmental and recreational needs of the local public. Opportunities exist to form new partnerships and to address specific issues (such as trail connections and illegal access) or to establish new traditions (such as Preserve volunteer days or an adopt-a-trail program).

- **Maintain ongoing liaisons and communication between the Habitat Authority and local, County, State, federal agencies, community organizations, and elected officials to maximize the potential benefits and opportunities.**
- **Survey Preserve visitors periodically to identify trends in activities, use, or attitudes. If feasible, adjust services, educational outreach, and/or operations to accommodate trends.**
- **Work with neighboring jurisdictions to provide a unified delivery of services in response to public safety emergencies and utilize the training and expertise of all personnel.**
- **Work with local recreation groups, neighboring jurisdictions, and the public to establish programs and events that promote Preserve stewardship and increase awareness of the Preserve's natural and cultural resources.**
- **Provide relevant information for local residents about living near the Preserve through vehicles such as the Habitat Authority Web site, newsletter, or periodic local newspaper coverage.**

6.5 VIEWSHED AND AESTHETIC PROTECTION

The Preserve represents a significant visual and scenic resource within the region, offering panoramic views of the Los Angeles Basin with mountains, the ocean, and the downtown Los Angeles skyline in the distance. The viewshed from within the Preserve contributes to the overall quality of visitors' experience and enjoyment of the Preserve. Situated in the midst of a highly developed region, the Preserve includes a variety of landscapes from the solitude of Powder Canyon and the rugged Turnbull Canyon to the meandering walk with the creek and beautiful trees of Sycamore Canyon. The historic uses of the property for grazing and oil extraction have preserved the property from development, affording visitors dramatic panoramic views of the region. Together the properties

provide a wealth of viewing conditions and opportunities. The properties offer visitors the experience of escaping the stresses of urban living and provide a respite for them to rejuvenate their minds and bodies. The visual landscape contributes to this process.

- **Work with local or appropriate jurisdictions in the land use planning and development process to protect key views in the Preserve from continued visual intrusion from surrounding development.** This coordination will include appropriate general plan land use designations, zoning to regulate building height and setbacks, landscaping, ridgeline protection ordinances, and development review and enforcement.
- **Work with local jurisdictions in the land use planning and development process to protect the Preserve from existing and future ambient light sources in adjacent developments.**
- **Coordinate protection and enhancement of visual resources in the Preserve with efforts to enhance Preserve holdings through land acquisition.** Priority areas for protection and enhancement include focal public use areas and main recreational facilities within the Preserve to prevent visual intrusion from adjacent development.
- **Use native plantings to visually buffer developed areas, enhance visual quality, and integrate with the surrounding native landscape.**
- **Locate site structures (e.g., restrooms and interpretive kiosks) to be sensitive to scenic views from and into the Preserve.**

6.6 PRESERVE MAINTENANCE

The main priority for the Habitat Authority is the stewardship of Preserve resources for both present and future generations. Ongoing maintenance promotes successful implementation of resource management activities. Routine operations and maintenance efforts in the Preserve also keep the Preserve safe, functional, and attractive for residents and visitors. The Habitat Authority will maintain facilities in the Preserve to ensure that resource values are preserved and that management activities are supported. The Habitat Authority will maintain trails and roads to prevent erosion and provide a safe and high-quality visitor experience.

6.6.1 Erosion Control

Wind, water, and human land use practices have resulted in severe erosion in parts of the Preserve. Roads, trails, and unvegetated areas along steep slopes are the most susceptible to erosion. Erosion control is critical for maintaining natural drainage patterns, water and soil quality, healthy aquatic ecosystems, and safe trail conditions. Recommended erosion control guidelines are listed below.

- **Evaluate the site.** On-site areas that are subject to severe erosion should be evaluated. Trees and vegetation to be preserved should be located and flagged, with access areas identified.
- **Select and install erosion/sediment control practices.** A qualified professional should determine the specific practices needed and direct installation as appropriate. All BMPs must be chosen carefully, located and installed correctly, and maintained well to be effective in controlling erosion and sediment. Ensure that sediment-trapping devices and erosion control

measures are accessible for maintenance and removal. The following BMPs may be considered, designed, and implemented on a site-specific basis (roughly in order from source to destination):

- Interceptor berms or wattles at the top of slope to divert and dissipate runoff away from unstable or denuded areas
- Properly designed culverts and drains that avoid concentration of runoff
- Vegetation (preserved and/or planted)
- Mulch (straw, wood chips, hydromulch, erosion control blankets, etc.)
- Contour wattles, rolling dips, or water bars to slow down and divert runoff on steep slopes, trails, and roads.
- Gravel filters, sand bags, permeable dams, etc., for filtering sediment out of runoff
- Sediment traps/basins at the base of slopes to allow soil particles to settle out and to attenuate runoff peaks
- **Develop a practice maintenance program.** Maintenance of all BMPs is essential for them to function properly. As practicable, they should be inspected regularly and after each rainfall event.
- **Control surface water runoff.** Divert and disperse surface water runoff originating upgrate of exposed areas to reduce erosion and sediment loss.

6.6.2 Road and Trail Maintenance

The purpose of the Habitat Authority is to acquire, restore, and maintain open space in the Puente Hills as a permanent protection for the native habitat. The proposed Trail Plan (Section 6.3.1), while still accommodating some low-impact recreational use on 47 miles of trail, involves the permanent closure of approximately 23 miles of trails. Only 0.8 mile of existing unauthorized trails will be converted to authorized trails, while the remaining 8.3 miles of unauthorized trails will be restored to native habitat. The simplified trail network proposed by the Trail Plan serves to fulfill the primary intent of the Preserve, which is to protect biological diversity in the region. Because planning for new trail routes is not a priority, the following general guidelines focus principally on trail maintenance and trail closure. However, new sections of trail may need to be constructed to reroute an existing road or trail in order to minimize environmental impacts. For this reason, a more comprehensive discussion of trail design guidelines, which includes guidelines specific to trail design and selection of trail alignments, is included in Appendix O.

Environmental Considerations.

- **In special status species habitat areas, trail use levels should be limited as appropriate to ensure protection of resources.** Techniques for limiting use may include but are not limited to physical access controls, seasonal or intermittent closures, restricted use permits, and exclusion of domestic pets.
- **Biological resource assessments should be conducted before specific trail routes are implemented.** Assessments should be conducted by a qualified biologist and include surveys for sensitive habitats and special-status species in the appropriate seasons. These assessments should

include recommendations to align the trail to avoid impacts to sensitive habitats, special-status species, and significant trees.

- **Removal of native vegetation should be avoided as much as possible.** The appropriate resource agencies should be contacted regarding any trail alignments that may impact sensitive habitats or special status species or their habitat and to ensure that plant replacement is native to the area.

Trail Amenities.

- **Sign standards should be adopted and implemented uniformly throughout the Preserve.**
- **Each trailhead should have an informational kiosk.** Informational kiosks should include a copy of the most recent Preserve map depicting the authorized trails. These kiosks should provide a summary of the rules and regulations regarding use of the roads and trails and describe the benefits of using the designated system of roads and trails and the detriments of nonsystem trail use and construction.
- **Use signs should be placed at each trail staging area.** Use signs should inform visitors of which types of trail use are appropriate, permitted, or prohibited on the trail; identify accessibility conditions and other ADA-related information; educate trail users about respecting private property along the trail route, and any special land use considerations.
- **When developing trailhead facilities, it is important to design the trail head access points to meet both management and user needs.** For trails designed for multiple use, a step-through stile is appropriate. Through use of barriers, stiles, vegetation, and natural terrain, access can be provided for the intended users.
- **Interpretive and protective signs should be located where appropriate.** Interpretive and protective signs should indicate natural resource or historical points of interest or sensitive areas. Signs should be designed to identify specimen habitat types and to educate the visitor by describing resource characteristics and values.

Trail Closure.

Decommissioning. The goal of decommissioning is to restore natural topography and native habitat as much as possible so that maintenance work is no longer needed and to prevent future environmental impacts. Shortcuts and unauthorized trails must be eliminated as soon as they are discovered. If left uncorrected, these unauthorized trails will encourage additional use and lead to damaged vegetation, soil erosion, and drainage problems. A key component of any trail closure plan is to create a fun and sustainable alternative.

- **In areas where the old trail is being relocated or abandoned, time 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 it to a more natural appearance, and help eliminate shortcutting. Depending on the terrain, one may use signs, rock, brush, fallen timber, and transplanted vegetation. It may, in some extreme cases, require the construction of temporary fencing to prevent use.

- **Compacted soil in the old trail tread should be broken up or scarified to allow the seeds and roots of new plants to penetrate.**
- **Surface drainage on abandoned routes needs to be addressed so that it is self-maintaining, adequately serves the area it drains, and does not deliver sediment to a creek.** Abandoned tread should be stabilized to prevent further erosion. This will promote natural revegetation in some instances. Trails break natural drainage patterns and collect and concentrate surface water flows. Restoring the natural contour of the slope reestablishes the local drainage patterns and reduces the likelihood of erosion. Recontouring usually eliminates any temptation to use the old trail and facilitates revegetation efforts.
- **Starting plants on the old trail is the best 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. Proper transplanting techniques, fertilizer, and a portable drip irrigation system should be used to reduce transplant shock.
- **The best way to keep people off the closed trail is to make it look like it was never there. The goal is to eliminate the visual corridor, including the airspace above the old trail tread.** Depending on the terrain, 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 new plants. As a last resort, the beginning and end of the trail may be blocked with a fence and signs. However, the fence will look out of place and could draw more attention to the closure, which may cause controversy. Answer expected questions by posting signage explaining the closure on or near the fence. When the trail has been closed for a while, the fence can be removed.
- **In some instances, Ranger patrol will be necessary to divert recreational use in an area that was once active.**

Seasonal Closure. Minimizing heavy traffic loads, especially during the rainy season, is one of the simplest ways to maintain an unpaved road or trail.

- **Close roads and trails susceptible to erosion or landslides whenever possible provided that they do not allow access to critical public water supply facilities or utilities.**
- **Close roads and trails when extreme fire hazardous conditions are determined by appropriate local authorities.**
- **All entry points onto a closed trail should be signed appropriately.** Some consideration may be given to including on the sign reference the estimated reopening date. Care should be exercised to promptly remove all closure signs when conditions have changed.

Trail Maintenance.

- **Prepare a Trail Maintenance System (not a part of this document).** Priorities for trail maintenance tasks are to:
 - Address trail conditions;

- Repair environmental damage; and
- Restore the trail to the desired conditions.
- **Trail work should be planned and implemented with the objective of providing for resource protection and public access.** Operating within budgetary and staffing constraints, the trail maintenance program should include:
 - Monitoring of each trail;
 - Trail work aimed as required toward preventing serious damage; and
 - Emergency repair work and/or signing to eliminate or to identify a possible safety hazard.
- **Practice environmentally sound maintenance and use techniques appropriate for the type of trail.** For example, avoid the use of chemicals to retard vegetation growth.
- **Guidelines for trail maintenance.** Repair heavily used trails as required and maintain on an as-needed basis.
 - Clear windfalls and dangerous trees from the trail bed for safety and to prevent detouring.
 - Remove loose rocks and debris from the tread surface.
 - Repair erosion-damaged facilities promptly 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 should be performed within a reasonable period of time. Where necessary, barriers to prevent further erosion should be erected until problems are corrected.
 - Remove new plant growth on the trail annually. Clear 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 7 ft to accommodate hikers and to a height of 10 ft to accommodate equestrian 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. Groundcover plants and low shrubs should not be removed except on the actual trail tread.
 - Level the trail tread as necessary and restore the tread grade to the original slopes. Use local material to fill ruts, holes, low spots, or muddy areas.
 - Check, repair, or replace signs and trail markers.
 - Maintain trailhead facilities such as toilets and waste containers.
 - Maintain switchbacks as warranted to reduce the need of costly reconstruction. Switchback maintenance involves the reshaping of tread to the intended drainage, cleaning of the inboard ditch on the upper leg, maintenance of the landing between upper and lower legs, and the rehabilitation of any shortcuts developing between legs.

Trail Monitoring.

- **An inventory of all trail maintenance, including drainage, vegetation clearing, signing, surfacing, need for graffiti removal and repair of structures, gates, fences, and barriers may be pursued if there are adequate resources in early spring, prior to the heavy summer use period.** A sample trail assessment form is located in Appendix O. Based on maintenance reports completed yearly at the end of summer for winterizing trails, trails should be subject to seasonal closures or repair as warranted.

6.6.3 Fencing and Boundary Control

As a result of the Preserve's size and location within a densely populated metropolitan area, there are numerous entry points from adjacent neighborhoods into the Preserve. Some of these entry points are unauthorized, "end of street" points used to gain access to unauthorized trails, while others are informal entries without developed trailhead facilities. Boundaries are periodically patrolled by ranger staff in order to protect Preserve resources and public safety. The Habitat Authority should enforce Preserve boundaries by maintaining property fencing and access points and by posting signs signifying Preserve property.

- **Enforce boundaries by maintaining site fencing and access points.**
 - Identify portions of the Preserve where fencing may be needed. Fencing should probably be installed or reinforced in areas adjacent to residential lots, roads, and other level areas. Fencing should be maintained as needed and monitored annually.
 - Establish property signs along the Preserve boundary and at each access point, identifying the area as a Preserve and providing directions for access and contact information.
 - Maintain all existing fencing and locked gates and establish a list of persons with keys to the Preserve.
 - Establish permanent markers for Preserve boundaries when appropriate.

6.6.4 Facility Maintenance

- **Log all structures and facilities with the Preserve and maintain in a safe condition that promotes usefulness.**
- **Maintain facilities in the Preserve to ensure that resource values are maintained and that management activities are supported.**
 - Maintain facilities and infrastructure. Existing gates and roads restrict public access and allow for emergency and fire response. Ongoing maintenance of gates, fences, and roads will allow these functions to continue. Removal of derelict structures in the Preserve will discourage trespassing and enhance aesthetic values of the Preserve.
 - Maintain trailhead facilities and structures to retain the integrity and value of the facilities.
 - Remove litter, trash, and debris that may attract nonnative wildlife and reduce the aesthetic values of the Preserve. Establish responsibilities for removing trash and for regular collection at specific locations. Enlist the help of volunteers for clean-up events at the Preserve.

- **Patrol public use of the Preserve to ensure compliance with the rules and regulations and to assess level of use by area of the Preserve.**
 - As budget allows, provide sufficient ranger staff to adequately address misuse of trails or other Preserve facilities.
 - Track trail use and determine which trails are used more frequently than others. Inspect the trails to monitor and mitigate for impacts. This may include restoring the outslope of the trail, installing waterbars, and pruning along the edge of the trail.
 - Issue citations, as needed, to persons that violate Preserve regulations. Fines levied for abuse of Preserve facilities resulting in harm to species or sensitive habitat should be sufficient to discourage repeat occurrences.
- **Develop a data management system to incorporate baseline data collected for the preparation of this RMP.**
 - Incorporate monitoring data collected to track the responses to resources to management actions.
 - Evaluate the suitability of the data management system for management purposes and refine the system, as necessary.
 - Maintain a record of management and monitoring activities.

6.7 FUTURE MANAGEMENT

The lands managed by the Habitat Authority are owned by various entities. They are managed by one entity under a comprehensive and cohesive management approach for consistency. Insofar as this comprehensive management approach is possible for additional lands within the Puente-Chino Hills Wildlife Corridor, it is encouraged.

The funding from the Puente Hills Landfill tipping fees to the Habitat Authority is scheduled to cease with the closing of the landfill in 2013 pursuant to Conditional Use Permit 02-027-(4). The joint powers agreement establishing this agency states that upon cessation of disposal operations at the Puente Hills Landfill under its authorizing operating permit, the Habitat Authority has two years to transfer all assets to an appropriate public agency as deemed by the Board of Directors to be consistent with the provisions of the establishing agreement.

The Board of Directors endeavors to create an endowment for the management of the properties in perpetuity. To this end, after the year 2013, resources for projects, activities, and/or programs will be limited. Properties will be maintained at a level that at a minimum maintains access and safety for visitors and the surrounding communities.

7.0 REFERENCES

- Abrams, L. 1923, 1944, 1951. *Illustrated Flora of the Pacific States, Washington, Oregon, and California*. Vols. 1–3. Stanford: Stanford University Press.
- Abrams, L. and R. Ferris. 1960. *Illustrated Flora of the Pacific States, Washington, Oregon, and California*. Vol. 4. Stanford: Stanford University Press.
- Alameda County Department of Public Works. Cross Alameda Trail Design Characteristics. Accessed in November 2005:
<http://www.ci.alameda.ca.us/publicworks/pdf/Chap6TRAILDESIGN.pdf>.
- American Ornithologists' Union. 1998. *The A.O.U. Checklist of North American Birds*, 7th Edition. American Ornithologists' Union, Washington D.C.; and 2000, 2002, and 2003 supplements.
- Architectural and Transportation Barriers Compliance Board. 1999. Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas Final Report. Accessed November 2005: <http://www.access-board.gov/outdoor/outdoor-rec-rpt.htm>.
- Atwater, T. 1970. Implications of Plate Tectonics for the Cenozoic Evolution of Western North America. *Geological Society of America Bulletin*, Vol. 81.
- Barbour, Michael G. and Jack Major, eds. 1990. *Terrestrial Vegetation of California*. California Native Plant Society Press, Special publication No. 9, University of California, Davis.
- Barbour, M., B. Pavlik, F. Drysdale, and S. Lindstrom. 1993. *California's Changing Landscapes: Diversity and Conservation of California Vegetation*. Sacramento, California: California Native Plant Society.
- Bean, Lowell John and Charles R. Smith. 1978. *Gabrielino*. Handbook of North American Indians, Vol. 8, pp. 538–563. William G. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.
- Bean, Walton. 1968. *California: An Interpretive History*. New York: McGraw-Hill. (Reprinted, McGraw-Hill, New York, 1973.)
- Beier, P. 1995. Cougar Dispersal in Fragmented Habitat. *Journal of Wildlife Management* 59:228–237.
- Bissell, Ronald. 1986. Cultural Resources Assessment of a 500+ Acre Parcel in Rowland Heights, Los Angeles County, California, Reference Number L=1615. On file at South Central Coastal Information Center, California State University, Fullerton.

- Blake, G. H. 1991. Review of the Neogene Biostratigraphy of the Los Angeles Basin and Implications for Basin Evolution. *In* K. Biddle, ed., *Active Margin Basins*. American Association of Petroleum Geologists, Memoir 52.
- Bloom, P., and S.R. Gallagher. 1997. Raptor species accounts, *in* Atlas of Breeding Birds, Orange County, California (S.R. Gallagher, editor). Sea and Sage Audubon Press, Irvine, California.
- Bolton, Herbert Eugene. 1927. *Fray Juan Crespi: Missionary Explorer on the Pacific Coast, 1769–1771*. Berkeley: University of California Press. (Reprinted, AMS Press, New York, 1971.)
- Bonham, C. D. 1989. *Measurements for Terrestrial Vegetation*. John Wiley & Sons, New York, NY.
- BonTerra Consulting. 2004. Plant Communities and Special Status Plant Species on the Puente Hills Landfill Native Habitat Preservation Authority. September 10, 2004. Los Angeles County, California.
- Boscana, Father Geronimo. 1933. *Chinigchinich: A Revised and Annotated Version of Alfred Robinson's Translation of Father Gerónimo Boscana's Historical Account of the Beliefs, Usages, Customs, and Extravagancies of the Indians of this Mission of San Juan Capistrano Called the Acagchemem Tribe*. Santa Ana: Fine Arts Press. (Reprinted, Malki Museum Press, Banning, California, 1978.)
- Bossard, C. C., J.M. Randall, M.C. Hoshovsky. 2000. *Invasive Plants of California Wildlands*. University of California Press, Berkeley, CA.
- California Department of Fish and Game. 2003. A Guide and Annotated Outline for Writing Land Management Plans (South Coast Region). Lands and Facilities Branch, Sacramento, California.
- California Department of Fish and Game, Natural Heritage Division. 1997. List of Fully Protected Animals, dated September 1997. The Resources Agency, Sacramento, California.
- California Department of Fish and Game, Natural Heritage Division, Natural Diversity Data Base (CNDDDB). 2004. Special Animals List, dated January 2004. The Resources Agency, Sacramento, California.
- . 2004. Special Vascular Plants Bryophytes and Lichens List, dated January 2004. The Resources Agency, Sacramento, California.
- . 2004. *RareFind III*. Records search executed September 14, 2004, covering the *La Habra, Whittier, El Monte* and *Baldwin Park, California* United States Geological Survey quadrangles. Sacramento, California: The Resources Agency.
- . 2004. State and Federally Listed Endangered and Threatened Animals of California, dated January 2004. The Resources Agency, Sacramento, California.

- California Department of Fish and Game, Natural Heritage Division, Plant Conservation Program. 2004. State and Federally Listed Endangered, Threatened, and Rare Plants of California, dated January 2004. The Resources Agency, Sacramento, California.
- California Department of Parks and Recreation Resources Agency. 1997. Forging a Future with a Past, a Comprehensive Statewide Historic Preservation Plan for California, Office of Historic Preservation.
- California Exotic Pest Plant Council. 1999. The CalEPPC List: Exotic Pest Plants of Greatest Ecological Concern in California, dated October 1999.
- California Native Plant Society (CNPS). 2003. *Inventory of Rare and Endangered Vascular Plants of California*. 6th Edition. Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. Sacramento, California.
- California Regional Water Quality Control Board Los Angeles Region (4). 1994. Water Quality Control Plan, Los Angeles Region. Adopted June 13, 1994.
- California State Parks. 2002. California Recreational Trails Plan, Phase 1. Sacramento, California: Department of Parks and Recreation, Planning Division, Statewide Trails Office.
- . 2003. Chino Hills State Park Trail Management Plan, Draft. 16 July. Chino Hills State Park, Riverside, California.
- . 2004. Kenneth Hahn State Recreation Area General Plan Amendment. Sacramento, California: Department of Parks and Recreation.
- . 2003. Malibu Creek State Park General Plan and Draft Environmental Impact Report. Sacramento, California: Department of Parks and Recreation.
- . 2002. Planning Handbook. Sacramento, California: Department of Parks and Recreation.
- Chapman, John L. 1967. *Incredible Los Angeles*. New York: Harper and Row, Publishers.
- City of Fayetteville Parks and Recreation Division. 2003. Alternative Transportation and Trails Master Plan.
- City of Pasadena Arroyo Seco Design Guidelines. Accessed November 2005:
<http://www.ci.pasadena.ca.us/publicworks/PNR/ArroyoSeco/ArroyoSecoDesignGuidelines.asp>.
- Cleland, Robert Glass. 1951. *The Cattle on a Thousand Hills: Southern California 1850–1880*. Second Edition. San Marino: The Huntington Library.
- . 1962. Introduction. In Hoover et al. *Historic Spots in California*. Pages xi–xiv. Stanford University Press.

- Colorado State Parks. 1998. *Planning Trails with Wildlife in Mind*. Denver, Colorado: Trails and Wildlife Task Force and Hellmund Associates.
- Conservation Biology Institute (CBI). 2005. Maintaining Ecological Connectivity Across the “Missing Middle” of the Puente-Chino Hills Wildlife Corridor. Encinitas, California.
- Cooper, D. S. 2000. Breeding Land Birds of a Highly Threatened Open Space: the Puente-Chino Hills, California. *Western Birds*. Vol. 31, No. 4., pp. 213–234.
- Corbin, J. D., and C. D’Antonio. 2004. Competition between Native Perennial and Exotic Annual Grasses: Implications for Historical Invasion. *Ecology* 85(5)1273–1283.
- County of Los Angeles Fire Department. 1998. Fuel Modification Plan Guidelines for Projects Located in Fire Zone 4 or Very High Fire Hazard Severity Zones. January. Los Angeles, California: County of Los Angeles Fire Department.
- . 2005. Los Angeles County Fire Department Fire History Maps.
- County of Los Angeles Public Library. 2001. La Puente Valley, Frequently Asked Questions. www.colapublib.org/history/lapuate/faq.html.
- Cramer, Esther R. 1969. *La Habra, the Pass Through the Hills*. Fullerton, California: Sultana Press.
- Crother, B.I. et al. 2000. Scientific and Standard English Names of Amphibians and Reptiles of North America, North of Mexico, with Comments Regarding Confidence in our Understanding. *Herpetological Circular* 29; and 2003 update.
- David, Lore Rose. 1943. Miocene Fishes of Southern California. *Geological Society of America Special Papers* Number 43: 16 January.
- Davis, T. L., J. Namson, and R. F. Yerkes. 1989. A Cross Section of the Los Angeles Area: Seismically Active Fold and Thrust Belt, the 1987 Whittier Narrows Earthquake, and Earthquake Hazard. *Journal of Geophysical Research*, Vol. 94.
- East Bay Regional Park District, 1995. Trail Manual for the Maintenance and Operation of Trails in the East Bay Regional Park District.
- Eliason, S.A., and E.B. Allen. 1997. Exotic Grass Competition in Suppressing Native Shrubland Re-establishment. *Restoration Ecology* 5:245–255.
- Engelhardt, Zephyrin. 1922. *San Juan Capistrano Mission*. Los Angeles: The Standard Printing Company.
- . 1927a. *San Gabriel Mission and the Beginnings of Los Angeles*. Chicago: Franciscan Herald Press.
- . 1927b. *San Fernando Rey: The Mission in the Valley*. Chicago: Franciscan Herald Press.

- Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
- Field, Edward H., et al. 2005. Loss Estimates for a Puente Hills Blind-Thrust Earthquake in Los Angeles, California. *Earthquake Spectra* 21(2):329–338.
- Flink, Charles, Kristine Olka, and Robert M. Searns, 2001. *Trails for the Twenty-First Century*. Washington, D.C.: Rails to Trails Conservancy.
- Fort MacArthur Museum Association. 2006. “Air Defense Units in LA.” Accessed February 2007 from the FTMAC Web site: <http://www.ftmac.org/Lanike1.htm>.
- Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles Audubon Society, Los Angeles.
- Gray, J., and D.E. Bramlet. 1992. Habitat classification system. Orange County Natural Resources GIS Project. Prepared for County of Orange EMA.
- Grenfell, W.E., M. D. Parisi, and D. McGriff. 2003. Complete List of Amphibians, Reptiles, Birds and Mammals in California. California Department of Fish and Game. http://www.dfg.ca.gov/whdab/pdfs/species_List.pdf.
- Gudde, Erwin G. 1969. *California Place Names*. Berkeley, California: University of California Press.
- Gurevitch, Jessica, Scheiner, Samuel, and Gordon A. Fox. 2002. *The Ecology of Plants*. Sunderland, Massachusetts: Sinauer Associates, Inc.
- Haas, Chris D. 2000. Distribution, Relative Abundance, and Roadway Underpass Responses of Carnivores throughout the Puente-Chino Hills. California State Polytechnic University, Pomona, California. Masters Thesis.
- Haas, Chris D., et al. 2002. Monitoring Reptiles and Amphibians at Longterm Biodiversity Monitoring Stations: The Puente-Chino Hills. U.S. Geological Survey, Sacramento, California.
- Hamilton, W. 1986. Crustal Evolution of Southern California during Cretaceous and Cenozoic Time. *Geological Society of America Abstract with Programs*.
- Harbert, W. 1991. Late Neogene Relative Motions of the Pacific and North American Plates. *Tectonics* 10:1.
- Harrington, John P. 1933. Annotations. In *Chinigchinich: A Revised and Annotated Version of Alfred Robinson's Translation of Father Gerónimo Boscana's Historical Account of the Belief, Usages, Customs and Extravagancies of the Indians of this Mission of San Juan Capistrano Called the Acagchemem Tribe*. Santa Ana: Fine Arts Press. (Reprinted, Malki Museum Press, Banning, California, 1978.)

- . 1986. John Harrington Papers, Vol. 3: Southern California/Basin. Smithsonian Institution, National Anthropological Archives, Washington. Microfilm Edition. Millwood, New York: Kraus International Publications.
- Henderson, Amy. 2006. Ecologist, Puente Hills Landfill Native Habitat Preservation Authority. September 12. Personal communication.
- . 2006. Ecologist, Puente Hills Landfill Native Habitat Preservation Authority. October 31. Personal communication.
- Hickman, J.C., ed. 1993. *The Jepson Manual: Higher Plants of California*. Berkeley and Los Angeles: University of California Press. 1,400 pp.
- Hillside Preservation Task Force and the Open Space Advisory Committee. 1998. Management Policies and Guidelines for the Whittier Hills Wilderness Preserve. Prepared for the City of Whittier, California.
- . 1998. Specific Management Plan, “Integrated Multiple Resource Management” for the Whittier Hills Wilderness Preserve. Prepared for the City of Whittier, California.
- Holland, R.F. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Non-Game Heritage Program, California Department of Fish and Game, Sacramento, California.
- Hoover, Mildred Brooke, Hero Eugene Rensch, and Ethel Grace Rensch. 1962. *Historic Spots in California*. Fourth Edition, revised by R. Teiser. Stanford, California: Stanford University Press.
- . 1966. *Historic Spots in California*. Revised by William N. Abeloe, Stanford, California: Stanford University Press.
- . 1990. *Historic Spots in California*. Revised by Douglas E. Kyle. Stanford, California: Stanford University Press.
- Hudson, D. Travis. 1971. Proto-Gabrielino Patterns of Territorial Organization in Southern Coastal California. *Pacific Coast Archaeological Society Quarterly* 7(2):449–476.
- International Erosion Control. Accessed December 2005 from the International Erosion Control Web site: <http://ieca.org/>.
- International Mountain Bicycling Association. “Closing and Reclaiming Damaged Trails.” Accessed November 2005 from the IMBA Web site: http://www.imba.com/resources/trail_building/reclaiming_trail.html.
- . Trail Building Basics. Accessed November 2005 from the IMBA Web site: www.imba.com/resources/trail_building/index.html.

- Kaplan, Meredith. National Park Service. 2004. Personal Communication.
- Kays, R.W., and D. E. Wilson. 2002. Mammals of North America. Princeton University Press, New Jersey, p. 240.
- Keeley, J.E. 1990. The California Valley Grassland, pages 3–23 in A.A. Schoenherr, ed. Endangered Plant Communities of Southern California. Southern California Botanists Special Publication No. 3.
- Kent, Douglas. 2005. *Firescaping: Creating Fire-Resistant Landscapes, Gardens, and Properties in California's Diverse Environments*. Wilderness Press, Berkeley, California.
- Laudenslayer, et al. 1991. A Checklist of the Amphibians, Reptiles, Birds, and Mammals of California. *California Fish and Game* 77:109–141.
- Ljubenkov, J. A. S., and T. Ross. 2001. An Annotated Checklist of the Vascular Plants of the Whittier Hills, Los Angeles County, California. *Crossosoma* 27 (1). Spring–Summer 2001. Issued August 2002.
- LSA Associates, Inc. 2006. Botanical Survey Report 2005, Puente Hills Landfill Native Habitat Preservation Authority Lands. Irvine, California.
- . 2004. Draft Biological Resources Assessment, Long Beach Sports Park, Long Beach, California. Irvine, California.
- . 2000. Draft Biological Resources of the Rose Hills Foundation, Turnbull Canyon Property, Los Angeles County, California. December 11. Irvine, California.
- . 2002. Draft Resource Management Plan, Volume 1, Rockville Hills Regional Park, Solano County, California. March 6. Point Richmond, California.
- . 2005c. Dragonfly, Butterfly, and Vertebrate Species Matrix for the Puente Hills Landfill Native Habitat Preservation Authority Lands, Results of Multispecies Surveys and Pitfall Trapping. Irvine, California.
- . 2005a. Results of Protocol Coastal California Gnatcatcher Surveys, Puente Hills Landfill Native Habitat Preservation Authority, Cities of Hacienda Heights, Whittier, and La Habra Heights, County of Los Angeles, California. Irvine, California.
- . 2005b. 2005 Rodent Survey of the Puente Hills Landfill Native Habitat Preservation Authority Lands. Irvine, California.
- Luyendyk, B. P. 1991. A Model for Neogene Crustal Rotations, Transtension, and Transpression in Southern California. *Geological Society of America Bulletin*, Vol. 103.

- Lyren, L.M. 2001. Movement Patterns of Coyotes and Bobcats Relative to Roads and Underpasses in the Chino Hills Area of Southern California. California State Polytechnic University, Pomona, California. Masters Thesis.
- Manolis, T. 2003. *Dragonflies and Damselflies of California*. Berkeley: University of California Press.
- Marin County Open Space District. 2004. Draft Trail Policies. County of Marin, California: Open Space and Trails Committee. September 29.
- Marin Municipal Water District. 2005. Mt. Tamalpais Watershed Road and Trail Management Plan. Accessed November 2005: http://www.marinwater.org/documents/RTMP_plan.pdf.
- McCawley, William. 1996. *The First Angelinos: The Gabrielino Indians of Los Angeles*. Banning, California: Malki Museum Press and Ballena Press.
- McKenna, Jeanette. 1997. Biennial Report for Archaeological Monitoring Services for the Puente Hills Landfill Expansion Areas, Whittier, Los Angeles County, California, Reference Number LS 3781. On file, South Central Coastal Information Center, California State University, Fullerton.
- Merriam, C. Hart. 1968. Village Names in Twelve California Mission Records. *University of California Archaeological Survey Report 74*.
- MHA Environmental Consulting Inc. 2001. San Mateo County Trails Plan. Accessed November 2005: http://www.eparks.net/vgn/images/portal/cit_609/12503872399%20Final%20Trails%20Plan.pdf.
- Miller, W.E. 1971. Pleistocene Vertebrates of the Los Angeles Basin and Vicinity (Exclusive of Rancho La Brea). *Los Angeles County Museum of Natural History Bulletin, Science*: No. 10.
- Moore Iacofano Goltsman, Inc. 2004. Policy Review Initiative Summary Report for the Marin County Open Space District. County of Marin, California.
- Moratto, Michael J. 1984. *California Archaeology*. San Diego: Academic Press.
- Moyle, P.B. 2002. *Inland Fishes of California*. 2nd Edition. Berkeley: University of California Press.
- National Park Service. 1996. North Country National Scenic Trail Handbook for Trail Design, Construction and Maintenance. August. <http://www.nps.gov/noco/pphtml/documents.html>.
- . San Juan Bautista de Anza Web site. Accessed in January 2005: <http://www.nps.gov/juba/anzatrai.htm>.
- National Park Service Rivers & Trails Conservation Assistance Program. 2004. Proposed DRAFT Access Strategies for People in the Puente Hills: A Comprehensive Trail Inventory and

- Action Plan, presented as a component to the Authority's Resources Management Plan. June 10. Los Angeles, California.
- Natural Resources Conservation Service. 1969. Report and General Soil Map of Los Angeles County. United States Department of Agriculture.
- Nilsen, T. H. 1987. Paleogene Tectonics and Sedimentation of Coastal California. In R. Ingersoll, and W. Ernst, eds., *Cenozoic Basin Development of Coastal California*. Rubey Vol. 6. Englewood Cliffs, New Jersey: Prentice-Hall.
- North American Butterfly Association. 2001. *NABA Checklist & English Names of North American Butterflies*. 2nd Edition. Morristown, New Jersey: North American Butterfly Association.
- North Fork Associates, September 2003. North Fork American River Trail Plan.
- Noss, Reed, Paul Beier, and William Shaw. 2002. Evaluation of the Coal Canyon Biological Corridor. Unpublished report prepared for Hills For Everyone, Brea, California.
- Oxendine, Joan. 1983. The Luiseño Village during the Late Prehistoric Era. Unpublished PhD Dissertation, Department of Anthropology, University of California, Riverside.
- Paris Mountain State Park Trail Management Plan. Accessed November 2005:
http://www/pmspf.org/trail_plan.htm.
- PCR Services Corporation, Frank Hovore & Associates, and FORMA Systems. 2000. Biological Resources Assessment of the Proposed Puente Hills Significant Ecological Area. Unpublished report prepared for the Los Angeles County Department of Regional Planning, Los Angeles.
- Pearce, Phyllis, Claire Radford, and Mary Ann Rummel. 1977. *Founders and Friends*. Rio Hondo and Whittier Historic Society, Whittier, California.
- PLAE, Inc. 1993. A Design Guide: Universal Access to Outdoor Recreation.
- Point Reyes National Seashore and the North District of Golden Gate National Recreation Area National Park Service. 2003. Trail Inventory and Condition Assessment with Recommendations. November. Accessed November 2005:
http://www.nps.gov/pore/home_mngmntdocs_trailinventory2003.htm.
- Puente Hills Landfill Native Habitat Preservation Authority. 2004. Verbal communication.
- Quinn, J. P. 1992. Rancho La Brea: Geologic Setting, Late Quaternary Depositional Patterns and Mode of Fossil Accumulation. In E. Heath and W. Lewis, eds., *The Regressive Pleistocene Shoreline, Coastal Southern California*. South Coast Geological Society Annual Field Trip Guidebook No. 20.

- Rathke, David M., and Melvin J. Baughman. 2005. "Recreational Trail Design and Construction" from the University of Minnesota Web site. Accessed November 2005:
<http://www.extension.umn.edu/distribution/naturalresources/DD6371.html>.
- Redin, T. 1991. Oil and Gas Production from Submarine Fans of the Los Angeles Basin. In K. Biddle ed., *Active Margin Basins*. American Association of Petroleum Geologists Memoir 52.
- Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands: California (Region 0). United States Fish and Wildlife Service Biological Report 88(26.10), 135 pp.
- . 1997. Revision of the National List of Plant Species That Occur in Wetlands. United States Fish and Wildlife Service, Washington, D.C. viii + 462 pp.
- Remington, S. 2006. Bat Surveys of the Puente Hills, Los Angeles County, California. Costa Mesa, California.
- The Resources Agency. Department of Parks and Recreation. 1998. Trails Handbook. Sacramento: California State Parks.
- Roberts, Fred M. 1998. A Checklist of the Vascular Plants of Orange County, California. Encinitas: F.M. Roberts Publications, 96 pp.
- Rosenthal, E. Jane, et al. 1991. CA-ORA-236, Coyote Canyon Cave Data Recovery Investigations, Coyote Canyon Sanitary Landfill, Orange County, California. Larry Seeman Associates, Inc. Ms. on file, UCLA Archaeological Information Center, Los Angeles, California.
- Safe Solutions Group. 2003. Draft Prescribed Fire Management Plan, Folsom Lake State Recreation Area, Placer County, California. July 29. Berkeley, California.
- Santa Clara County. 1995. Final Countywide Trails Master Plan. November.
- . Interjurisdictional Trails Committee. 1999. Uniform Interjurisdictional Trail Design, Use, and Management Guidelines. April 15.
- Sawyer, J.O., and T. Keeler-Wolf. 1995. A Manual of California Vegetation. Sacramento, CA. California Native Plant Society.
- Schmahl, Larry. 2005. Personal Communication.
- Scientific Resource Surveys, Inc. 1989. Cultural Resource Survey Report on the Whittier Property. Reference Number L-17476, on file, South Central Coastal Information Center, California State University, Fullerton.
- Scott, T. A., and D. S. Cooper. 1999. Summary of Avian Resources of the Puente-Chino Hills Corridor. January. Department of Earth Sciences, University of California, Riverside, California.

- Shuford, W.D. 1993. *The Marin County Breeding Bird Atlas: a Distributional and Natural History of Coastal California Birds*. Bushtit Books, Bolinas, California.
- Sibley, David A. 2003. *The Sibley Guide to Birds of Western North America*. New York: Chanticleer Press, Inc.
- Society of Vertebrate Paleontology (SVP). 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines. *Society of Vertebrate Paleontology News Bulletin*, No. 163, January 1995, pp. 22–27.
- Soil Survey Staff, Natural Resources Conservation Service, and United States Department of Agriculture. 1999 and 2003. *Soil Taxonomy*.
- . Soil Series Classification Database. Accessed February 10, 2004: at <http://soils.usda.gov/soils/technical/classification/scfile/index.html>.
- Stebbins, Robert C. 1985. *A Field Guide to Western Reptiles and Amphibians*. 2nd Edition. Boston: Houghton Mifflin Company.
- Sundberg, F. A. 1984. Paleontologic Grading Monitoring Report on TT 10896, 11217, and 11281, Colonias de Capistrano, Orange County, California. Scientific Resources Surveys report for Colonias de Capistrano Developments, Inc.
- . 1991. Paleontologic Monitoring Report for the Foothill Ranch Project Tentative Tract 117525 and 13419, Orange County, California. Scientific Resources Surveys, Inc., SRS Project Numbers 845, 853, 929, and 930.
- Swift, Cheryl. 2004. Recommendations for Restoration in the Western Puente Hills, Final Draft. Department of Biology, Whittier College, Los Angeles, California.
- Tennessee Department of Environmental and Conservation. Erosion and Sediment Control Handbook. Accessed November 30, 2005: http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/.
- Teracor Resource Management. 2002. Presence/Absence Report for the Coastal California Gnatcatcher (*Poliophtila californica californica*) and General Avifaunal Survey for the Former Unocal Property in the Puente Hills. September 16. Los Angeles, California.
- United States Department of Transportation Federal Highway Administration. 2004. Trail Construction and Maintenance Handbook. Accessed November 2005: <http://www.fhwa.dot.gov/environment/fspubs/00232839/page12.htm>.
- United States Fish and Wildlife Service. 1996. Endangered and Threatened Wildlife and Plants, Review of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species. United States Department of the Interior. *Federal Register* 61:7595–7613.

- . 1997. Endangered and Threatened Wildlife and Plants: Revision of Plant and Animal Taxa that are Candidates for Listing as Endangered or Threatened Species. United States Department of the Interior. *Federal Register* 61:7595–7613.
- . 1997. Endangered and Threatened Wildlife and Plants: Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Finding on Recycled Petitions, and Annual Description of Progress on Listing Actions. United States Department of the Interior. *Federal Register* 62:49397–49411 (September 19, 1997).
- United States Geological Survey Western Ecological Research Center. 2002. *Responses of Large and Medium-bodied Mammals to Recreation Activities: the Colima Road Underpass*, Final Report prepared by Chris Haas and Greta Turschak for Puente Hills Landfill Native Habitat Preservation Authority.
- University of Southern California, Center for Sustainable Cities. 2006. Park Visitor User Survey. Presented to the Puente Hills Landfill Native Habitat Preservation Authority, Whittier, California.
- Vogel, Charles. 1982. *Equestrian Trails Manual*. Sylmar: Equestrian Trails, Inc.
- Vogelsang, Keith M., James D. Bever, Margot Griswold, and Peggy Schultz. 2004. The Use of Mycorrhizal Fungi in Erosion Control Applications. Final Report prepared for Caltrans Contract No. 65A0070.
- Wagner, Henry R. 1941. *Juan Rodriguez Cabrillo: Discoverer of the Coast of California*. San Francisco: California Historical Society.
- Wallace Roberts & Todd, LLC. 2004. Administrative Draft General Plan/Resource Management Plan, Folsom Lake State Recreation Area, Placer County, California. April 29. San Francisco.
- Wallace, William J. 1955. A Suggested Chronology for Southern California Coastal Archaeology. *Southwestern Journal of Anthropology* 11(3).
- Weinroth, Orna. 1994. National Indian Policy Center (NIPC) List of Federally Recognized Native American Tribes. Masters Thesis available on e-mail: Orna@gwis.circ.gwu.edu.
- White, Raymond C. 1963. Luiseño Social Organization. *University of California Publications in American Archaeology and Ethnology* 48(2):91–194.
- Whittier Historical Society/Whittier Museum. 2004. *Garland Courts*, Curator.
- . 1920. *Whittier News Annual Edition*.
- . 1923. *Whittier News Annual Edition*.
- . 1917. *Whittier News Annual Edition*.

Yerkes, R. F., and R. H. Campbell. 1979. Stratigraphic Nomenclature of the Central Santa Monica Mountains, Los Angeles County, California. *United States Geological Survey Bulletin 1457-E*.

APPENDICES ARE LOCATED IN A SEPARATE DOCUMENT

- A PRESERVE USER SURVEY
- B SOIL TAXONOMY AND ANALYSIS
- C TRAIL CONDITION ASSESSMENT
- D PLANT COMMUNITIES
- E VASCULAR PLANT SPECIES OBSERVED
- F ANIMAL SPECIES LIST
- G EXOTIC PLANT SPECIES DISTRIBUTION
- H RAPTOR SPECIES AT THE PRESERVE
- I SENSITIVE SPECIES TABLE
- J ARCHAEOLOGICAL RESOURCES
- K PALEONTOLOGICAL RESOURCES
- L PUENTE HILLS LANDFILL NATIVE HABITAT PRESERVATION AUTHORITY
ACQUISITION CRITERIA
- M FUEL MODIFICATION PLAN
- N HABITAT RESTORATION FRAMEWORK PLAN
- O TRAIL DESIGN GUIDELINES
- P SIGNIFICANT REFERENCES AND STUDIES USED TO PREPARE THE RESOURCE
MANAGEMENT PLAN