GRIFFITH PARK WILDLIFE MANAGEMENT PLAN

DRAFT

Acorn woodpecker *Melanerpes formicivorus*, a local resident in oaks and sycamores in Griffith Park

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1. ACKNOWLEDGEMENTS

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2. EXECUTIVE SUMMARY

At more than 4,000 acres, Griffith Park is one of the largest municipal parks in the U.S. It is also one of the wildest, with rugged, chaparral-cloaked slopes and isolated arroyos rarely visited by the 5 million people living within an hour's drive of its boundaries. Until 2007, few formal wildlife surveys had ever been conducted in the park, and virtually no birders, botanist or other trained naturalists had ever published or even taken notes on its species. After a devastating fire swept through 800 acres of the park in May 2007, Cooper Ecological Monitoring, Inc. initiated an effort to document the park's biodiversity, and to provide recommendations to the City of Los Angeles for future management of its resources. This report represents the first step toward that goal, and establishes a baseline in terms of known threats to wildlife. Its recommendations will help ensure future co-existence between the rich diversity of wildlife species supported by Griffith Park and the thousands of human visitors to the park each year.

Examples of Best Management Practices addressed in this plan include:

Stopping current activity

- Refrain from removing dead trees and fallen wood, except where this poses an imminent safety hazard.

- Cease planting new plant material and landscaping in wildland areas away from culturally-significant gardens, except as part of professional habitat restoration effort.
- Avoid new light- and noise-creating features in park.

Continuing existing activity

- Continue to support research on wildlife status, including sensitive species presence/absence, wildlife movement corridors and choke-points, impacts of human activity (incl. off-leash dogs).
- Continue to work with local biologists (or hire one on staff) to identify and promote biological "hotspots" where diversity is high or where natural community is particularly significant.
- Continue to remove most invasive exotic vegetation, particularly in burn area where soil is most vulnerable to invasion.

Modifying existing activity

- Store garbage away from wildland areas (e.g., move out of upper Ferndell/Western Cyn.).
- Replace open-top garbage cans with closed-top ones, and replace broken dumpsters.
- Allow for "passive restoration" of streams and culverts by ceasing herbicide spraying/brush clearance, planting natives, and removing exotic species.
- Retire trails (including unauthorized trails) causing damage to sensitive habitat areas, and post signs and educate park users to changes.
- Rotate temporarily closures of trails to allow for recovery of ecosystem.
- Redo lighting around park to minimize disturbance to wildlife.
- Reduce mowing and irrigation locally to soften edges between lawns and wildland area.

New activity

- Erect split-rail/"wood-crete" fencing around the most sensitive habitat areas, such as streams and native oak groves, taking care not to impair aesthetics.
- Restore portions of streams by removing cement, including artificial channels and non-functional check-dams.
- Begin removing planted trees (eucalyptus, pines) from wildland areas except in established, culturally-significant gardens (e.g., Dante's View, Amir's Garden).
- Begin removing unused irrigation pipe from natural areas of park.
- Work with local groups to educate residents about keeping pets and pet food indoors, securing buildings from invasion by wildlife and vermin, and reducing the use of rodenticide.

3. INTRODUCTION

3.1. *Purpose*

This Wildlife Management Plan is written primarily for the Department of Recreation and Park and City of Los Angeles staff to assist in land management decisions in Griffith Park and the surrounding open space areas, including the Hollywood Hills and the Los Angeles River. Its purpose is to examine Griffith Park's natural communities and to establish best practices for managing wildlife within the park. The primary goal of the plan is to synthesize

known biological information from the vicinity of the park, and to use this to minimize human-wildlife conflict, thereby benefiting both human recreationists and native wildlife living in the park.

An anticipated use for this plan is to facilitate effective collaboration between park staff, scientific experts, and interested citizens to protect and enhance the well-being of Griffith Park's biodiversity. Along with an accompanying website, this plan may serve as a dynamic, up-to-date source of environmental information readily available to staff and the general public. The goal of this access is to increase environmental education among park users and help strengthen a sense of community stewardship for Griffith Park.

This plan was written with the understanding that, as Griffith Park is not fenced, wildlife moves freely between the park and nearby residential property. Thus, any wildlife management steps taken in the park must also take into account these privately-owned properties on the park's borders, as well as both open space and residential areas of the entire eastern Santa Monica Mountains ecosystem. As the wildlife management website develops, we envision adding interactive functions such as mechanisms for submitting significant wildlife sightings, photographs, seasonal observations, and other features that will make this plan relevant to park users and local residents alike.

3.2 *History*

After seeing Europe's public parks while touring the Continent in the late 1800s, California mine speculator Col. Griffith J. Griffith decided that in order to become a great city, Los Angeles needed a park of its own (Eberts 1996). This vision became a reality on December 16th, 1896, when he donated 3,015 acres of his Rancho Los Feliz property to the city of Los Angeles. This donation came with the condition that the land remain in perpetuity a place that any resident could freely visit for recreation. Said Griffith on the day of the donation, "It must be made a place of rest and relaxation for the masses, a resort for the rank and file, for the plain people. I consider it my obligation to make Los Angeles a happy, cleaner, and finer city. I wish to pay my debt of duty in this way to the community in which I have prospered." (*Ibid*).

Over the years, the park grew through donations and purchases to its current size of 4,217 acres, and many recreational facilities have since been established in the park. In the 1910s and 1920s the Harding and Wilson golf courses, the Girl's and Boy's camps, and Fern Dell were built. The 1930s and 1940s saw the construction of the Greek Theater and the Griffith Observatory, as well as a third golf course and further development of vehicular routes and hiking trails for visitor to access the park interior. In 1952, the Travel Town museum was dedicated, followed the Los Angeles Zoo opening in 1966. Despite a legal injunction by Col. Griffith's son, Van Griffith a 16 million ton landfill in Toyon Canyon opened in 1957. Closed since 1985, gas from the landfill supplies an electrical generating system, but the canyon is currently (2007) under closure construction with the potential of being used as an area for passive recreation (Toyon Canyon Landfill, undated). The final major addition to the park's recreational facilities, the Autry Western Heritage Museum, was opened in 1987 adjacent to the zoo.

Even before this, but increasing since the 1980s, local neighborhood organizations have successfully limited new construction within the park; a 2004 management plan (Melendrez Design Partners 2004) that presented various built features was met with fierce opposition by the community, and this current era of Griffith Park will likely see an emphasis on preserving, rather than developing, the park.

3.3 *Setting*

Griffith Park is located within Los Angeles city limits at the eastern end of the Santa Monica Mountain range. It lies wholly within the California Floristic Province, a biome considered one of 34 biodiversity hotspots for conservation worldwide due to its high levels of diversity, endemism, and the degree to which it is threatened (Myers et al. 2000). Elevations within the park range from just over 100 m along the Los Angeles River to more than 500 m a.s.l. along the highest ridges. Although Griffith Park contains a number of recreational facilities its rugged interior remains undeveloped aside from a network of trails, bridal paths, and fire roads totaling 85 km. The natural landscape consists of native vegetation types (mixed chaparral, mixed scrub, oak-sycamore riparian, oak woodland and walnut woodland) and areas of introduced or altered vegetation (including pine and eucalyptus plantations), the latter particularly in the eastern portion of the park (Melendrez Design Partners 2004).

As the Los Angeles river floodplain became channelized along the park's northern and eastern border, the land surrounding the park became increasingly urbanized to the point where Griffith Park is today essentially an urban island, rising high above the city and separating the San Fernando Valley from Hollywood and the coastal plain. An ecologically similar area of undeveloped, privately-owned land abuts the northwestern portion of the park, and Forest Lawn Cemetery adjoins the park's northern border.

The park's open space is separated from the rest of the Santa Monica Mountains to the west by major roadways (US 101, Interstate 405), and by dense urban development on all other sides. (Fig. 1). The average housing unit density east and south of the park exceeds 5,000 houses per square mile (U.S. Census 2000). Still, important movement corridors for wildlife remain in the form of bridge overpasses spanning US 101, and flood control channels elsewhere.

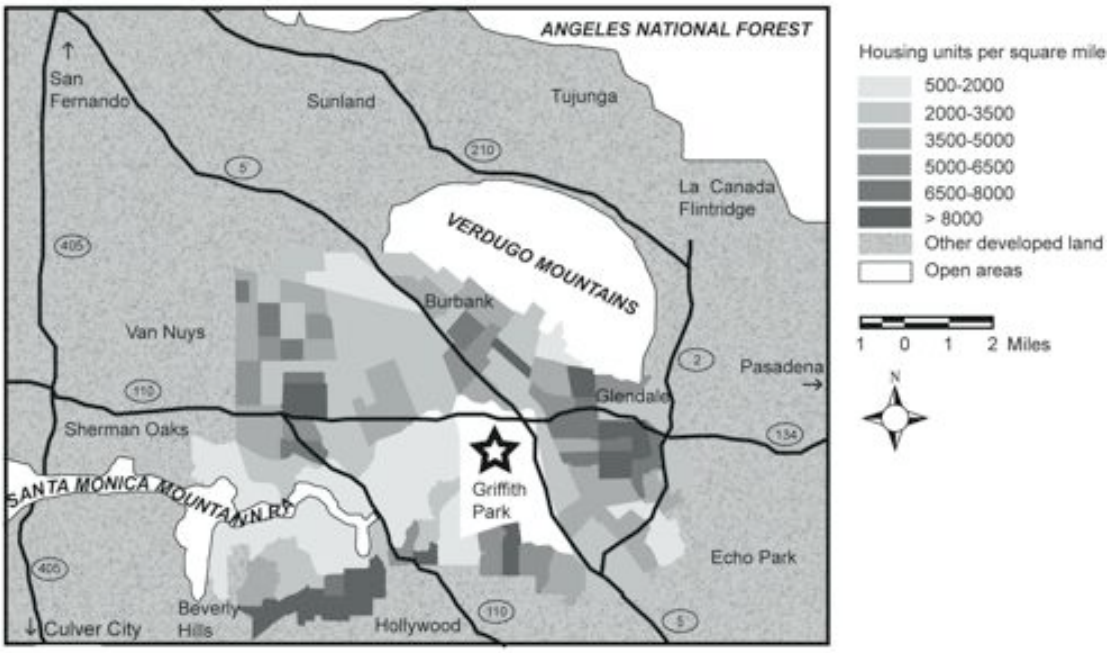

Figure 1. Map showing the location of Griffith Park relative to surrounding open space and surrounding housing density. See http://www.friendsofgriffithpark.org/GPNHS/Griffith.htm for additional maps.

3.4 *Existing Scientific Knowledge*

In spite of its location within this highly urbanized landscape, there are frequent sightings and reports of large mammals by local residents from the park and the surrounding hilly residential area, including mule deer and bobcat. Still, prior to 2007, the park remained virtually un-studied biologically, with scattered museum specimens (most from the early 1900s) providing the only information of plant and animal distribution within the park.

Preliminary studies of certain wildlife species distribution and habitat use were initiated in early 2007 to provide baseline data on wildlife in the park, and to guide this management plan. However, a more complete understanding of wildlife resources gathered from further long-term monitoring programs is necessary to make more detailed and specific recommendations within Griffith Park. Given these limitations, this management plan will broadly address relevant wildlife management issues in a manner easily adaptable to findings from future studies, and represents a significant step in the protection of the park's wildlife resources. This document will also elucidate relevant California law and Los Angeles Municipal Code provisions that benefit wildlife (Appendix I).

3.5 *Wildlife Management Plan Goals and Guiding Principles*

Wildlife management at Griffith Park was lightly treated in the recent Griffith Park Master Plan (Melendrez Design Partners 2004), though little specific information on wildlife populations was presented. The community-driven master plan "redraft" (2005; see: http://www.ggpnc.org/gpmasterplan-redraft-plantanimal.pdf) provided more detail, identifying six goals for management:

1. "Manage the natural habitat of the park to maintain, rehabilitate and restore existing ecosystems in all areas of the park" (including hiring a park ecologist, training staff, developing species lists, restoring habitat, limiting development, etc.).
2. Manage and maintain watersheds within the park to support aquatic biodiversity and riparian habitat in the park's watercourses and the L.A. River"
3. "Manage the rehabilitation of all areas of the park consistent with the urban wildnerness identify"
4. "Manage the park trails to prevent undesireable impacts on native vegetation, wildlife habitat and hillsides"
5. "Acquire additional open space"
6. "Create, restore and maintain wildlife corridors"

We suggest starting with four "guiding principles" for managing the park's wildlife, and then distilling goals from these principles:

- Wildlife management shall conform to Col. Griffith's original vision of the park.
- Management decisions will be based upon the best available science.
- The plan will balance human land use needs and rights with environmental considerations.
- Local community involvement in the decision-making process will be an integral part of future wildlife resource management actions.

Our primary wildlife management goals:

- Promote protection and enhancement of native wildlife populations and habitat.
- Facilitate the collection of wildlife distribution and ecological information.
- Minimize human-wildlife conflict.
- Promote basic ecological education among park staff and park users.

4. HABITAT ACCOUNTS

In this section we describe the major vegetation communities that comprise the different wildlife habitats in Griffith Park. We also recommend management practices specific to each habitat type. Many management practices are applicable to multiple habitat types, and general practices to enhance wildlife habitat in the park are also discussed in Section 6 of this plan. It should be stressed that, while we do divide individual habitats and provide specific management recommendations for each, it is imperative that park managers view the habitat types as interconnected pieces of an overall habitat mosaic. Many animal species have multiple habitat requirements, and the suite of species found in any given habitat type is influenced by the adjoining habitat (Sisk et al. 1997). Thus, habitats should not be managed

exclusively on an individual basis; maintaining the "ecotones" between habitat types is critical for managing wildlife in the Park.

Best management practices that transcend habitat categories include the removal the seemingly endless miles of unused, rusting water pipes that cover large areas of habitat in the park, a remnant of historical irrigation schemes (see Fig. 1a). Many of these have become "attractive nuisances", the larger ones surrounded by trampled vegetation (or bare dirt) and covered with graffiti. Another possible action could involve rotating temporary closures of the most sensitive habitat areas to allow the natural communities to recover from chronic disturbance and degredation, if these cannot be addressed through normal management.

Figure 1a. The convergence of several habitat issues; unused water pipe (covered with graffiti) with illicit trail (encouraging trampling and root damage), vic. Ferndell. Photographed Feb. 2008 by Daniel S. Cooper.

4.1 *Terrestrial Habitats*

4.1.1 Chaparral

Description: The dominant vegetation of the park, this community is made up of tall, dense shrubs with short, thick leaves. Plants like California-lilac, Toyon (the "hollyberry" for which "Hollywood" is named) and sumacs are common, with scattered oaks and walnuts providing vertical structure. This vegetation is so widespread in southern California that it scarcely draws notice except in fall

and winter when it burns in often catastrophic brush fires. California chaparral shares many species with coastal sage scrub and oak woodland habitat, these three vegetation types forming a matrix the state's hills and valleys west of the deserts.

Ecological value: Characteristic wildlife species of chaparral (including that within Griffith Park) include the dusky-footed woodrat, which builds huge stick-nests at the base of shrubs, and several all-brown songbirds unique to California occur most commonly here, including the California towhee, the California thrasher, and the wrentit. Though no wildlife species appears to be dependent on this vegetation type, it is possible that some of the more remote tracts on higher peaks (e.g. Mt. Chapel) still support widely-extirpated species like Costa's hummingbird and coast horned lizard.

Best Management Practices: While most studies of shrubland management in southern California have focused on coastal sage scrub (see below), many of the same ideas should be used in managing chaparral habitat for wildlife. As the dominant vegetation type in Griffith Park, chaparral is critical for maintaining connectivity among and providing buffers between the park's other natural communities, and should be monitored for deterioration. A Representative examples of rarer chaparral varieties (e.g., chamise chaparral, manzanita chaparral) should be protected throughout the park where they occur naturally, and must be particularly from arson, dumping and other threats.

4.1.2 Coastal sage scrub

Description: Coastal sage scrub is one of the most threatened habitat types in the United States, with an estimated 40-66% of its original range having been converted for anthropogenic use, and 50% of what remains considered degraded (Allen and O'Connor 2000). Comprised of short, aromatic shrubs and patches of native grasses, this vegetation community is wholly restricted to the coastal slope of California and adjacent Baja California, Mexico, and supports a high percentage of endemic (found nowhere else) species. In Griffith Park, sage scrub is best-developed in the far northeastern corner of the park (low hills north of the L.A. Zoo), and along a broad arc extending from just east of Vermont Canyon west across Western and Brush canyons, and around the Hollywood Reservoir into Cahuenga Pass. Succulents, including spiky yucca plants and native cactus of two species, the beavertail *Opuntia littoralis* and the cholla *Opuntia parryii* are hallmarks of this habitat type, as are eroding gravel and sandy soils. Remnant examples of Riversidean Alluvial Fan Scrub, a "priority" (rare) native scrub community (CNDDB, n/d), persists on sandy soils along the river channel vic. Forest Lawn Dr. (incl. the "Headworks" site). Another priority native community, Valley Needlegrass Grassland, occurs in small patches within coastal sage scrub.

Ecological value: Insect and reptile species diversity in eastern Santa Monica Mountains is probably highest in this habitat type, with coastal western whiptail (lizard), rufous-crowned sparrow and several butterflies essentially confined to

this vegetation in the park; future studies and mapping efforts should help clarify this. The strips of alluvial fan scrub along the river (incl. the "Headworks" site) have not been well-studied, but may support remnant San Fernando Valley scrubland animal populations, including side-blotched lizard and California legless-lizard.

Best Management Practices: Identification and mapping of best remaining examples of coastal sage scrub, including associated alluvial fan scrub and needlegrass grassland, is a top priority. Natural regeneration of CSS is a slow process, and active restoration (hand-planting native container plants and/or hydroseeding) may be necessary for some areas of the park, and relevant Griffith Park staff should remain abreast of the latest techniques for success. Several general recommendations include:

- Locating restoration sites close to existing high-quality scrub to facilitate the spread of native understory herbaceous species (Allen et al. 2000, CalPIF 2004).
- Emulating naturally-occurring "model" sites (with similar soils, slope, and aspect) to reproduce high-quality habitat for obligate species, rather than simply relying on hydroseeding (Bowler 2000).
- Using seeds and container plants of local genetic stock (Montalvo and Ellstrand 2000).
- Employing a weed abatement strategy (see Allen et al. 2000 for discussion of eutrophication due to automobile exhaust).

4.1.3 Oak woodland

Description: In Griffith Park, this woodland occurs in small patches, mainly on north-facing slopes and terraces above streams, where it co-occurs with Southern California Black Walnut Woodland, a globally-rare plant community (identified by its bright yellow foliage in fall) considered a "priority" community by State agencies (CNDDB, n/d). The oak and oak-sycamore woodland along most streams in Griffith Park is considered another "priority" community (*Ibid*), South Coast Live Oak Riparian Forest. Several picnic areas in the park have been carved out of oak woodland, including that around the Merry-Go-Round along Crystal Springs Rd., most of Fern Dell.

Ecological value: Oak woodland is believed to have the highest wildlife species richness of any habitat in California, owing to their rich food and shelter resources (CalPIF 2002). Large trees provide the most acorns for food and sapling recruitment, and are preferentially selected for nesting by raptors, and they provide the most shelter in the form of cavities, and their branches produce the largest snags and other wildlife habitat (Tietje et al. 1997*a*, CalPIF 2002). Animals, like people are drawn to oak woodland for its shade, especially in the hot days of summer and fall. The oaks produce acorns, which are hoarded and eaten by a wide variety of wildlife, including western gray squirrel and acorn woodpeckers. Other characteristic oak woodland residents include birds like the acorn woodpecker, oak titmouse and purple finch; and several amphibians, including the poorly-known (in our region) arboreal salamander, ensatina, and

the black-bellied slender-salamander, the latter confined to southwestern California.

Best Management Practices: The largest groves and oldest oak trees found in the park should be actively protected from trampling (human and dog) and other disturbances through fencing and appropriate routing of trails for minimal impact to groves. Dead trees and limbs should be retained whenever they do no interfere with public safety, as cavities often form in decaying trees (*Ibid*). When trees require pruning out of safety concerns, cut branches should be left on the forest floor along with all other downed woody material, where it supports the rich terrestrial diversity of the oak woodland (Tietje 1997*b*).

Manual oak seedling planting, while feasible, is a costly and time-consuming process (Osterling 1997), and thus it may be more efficient to identify and actively protect naturally-occurring seedlings where they already exist in the park (CalPIF 2002; e.g., Spring Canyon, pers. obs.). Many restoration projects employ tree shelters to protect seedlings from herbivory (e.g., Weitcamp et al. 2001, Tyler et al. 2002); however at least one study showed greater seedling survival using oak leaf mulch than using tree shelters (Plumb and De Lasaux 1997).

4.1.4 Sycamore Woodland

Description: One of the most distinctive landscape features of southern California, the sycamore-lined canyons of the park support many of the same species found in oak woodland, as well as some of those typical of riparian woodland. Limited in extent by the amount of water near the surface of the ground, this habitat type is best developed along Brush Canyon, Fern Canyon (though recently burned), and Royce Canyon, and also in drainages surrounding the Hollywood Reservoir.

Ecological value: The oak-sycamore woodland along most streams in Griffith Park is considered a "priority" community (CNDDB, n/d), South Coast Live Oak Riparian Forest. Geupel et al. (1997, as cited in RHJV 2004) found that bird diversity in a California riparian woodland increased with an increasing number of shrub species, and a dense and structurally complex understory consisting of a diverse array of shrubs, forbs, and sedges has been correlated with increased reproductive success for many bird species, and it serves as important habitat for other non-avian species (RHJV 2004). Large mammals like gray fox, bobcat and mule deer are probably most common along these canyons, which also support amphibians like Pacific chorus-frog and songbirds like the Pacific-slope flycatcher. Nesting bird species diversity is probably nowhere higher in the park than along sycamore-lined streams.

Best Management Practices: Griffith Park's sycamore woodlands should be managed to promote structural diversity and understory growth (RHJV 2004), which is currently being degraded in most canyons by human and dog trampling. Fire prevention and appropriate trail management (fencing, routing trails so as to not impact woodland understory) should be a top priority around these

drainages, with fire prevention a particular necessity during the fall when human usage, dry winds and fire danger is highest. Since the park's most extensive sycamore groves have been converted to picnic areas (e.g., Crystal Springs area), every effort should be made to identify potential restoration areas within these parkland areas.

4.1.5 Rock Outcrops

Description: Though Griffith Park is steep, it has very few areas of exposed rock. Bee Rock, toward the eastern edge of the undeveloped portion of the park (southwest of the Los Angeles Zoo) is the largest, though smaller, less-dramatic formations also occur in upper Royce Canyon, lower Brush Canyon (including the man-made Bronson Caves), and in the Mineral Wells area near the Boy Scout Camp.

Ecological value: These outcrops are little-studied, though we suspect that mammals, from bobcats to several species of bats, occupy crevices and caves during the day. The odd canyon wren, a rock specialist, has recently been discovered in Spring Canyon just below Bee Rock, and some reptile species, including the rarely-seen night snake, are closely associated with loose slabs of rock. Succulent mats composed of plants in the genus *Dudleya* and various mosses are found in these zones, which form miniature gardens of flowers, blue butterflies, and other native insects.

Best Management Practices: Rocky areas of the park should be investigated for use as denning, nesting, or roosting sites, and access to sensitive sites should be restricted accordingly, perhaps only seasonally. In the interest of public safety, as well as protection of wildlife habitat, visitors should be discouraged from dislodging any rocky structures and climbing tall outcroppings (this does not appear to be a problem in the park currently, but may in the future).

4.1.6 Ruderal

Description: "Ruderal" refers to weedy vegetation on land that humans have disturbed, and in Griffith Park this has been mostly limited to the Toyon Canyon Landfill and the edge of Forest Lawn Cemetery. However, the 800-acre fire in May 2007 will probably result in an expansion of this habitat in the southeastern corner of the park.

Ecological value: Dominated by non-native weeds, ruderal habitat is still important because it retains some of the characteristics of native grassland which has been all but eliminated in the Los Angeles area. Several species of raptors (hawks, falcons) depend on these areas for hunting, especially the declining American kestrel, and a wide variety of sparrows and finches forage on grass seeds here in fall and winter. Mammals such as the California ground-squirrel, pocket-gopher and harvest mouse occur in abundance, providing a food base for a variety of birds, reptiles (including Pacific rattlesnake and gopher snake) and larger mammals.

Best Management Practices: Every effort should be made to promote the establishment of native plant species in these disturbed areas. Effective controls for invasive plant species should researched and employed to reduce competition with native species. The replacement of these weedy areas with native grassland habitat (or a close approximation thereof) would serve as an important resource not only for the larger fauna of Griffith Park, and would also help to reestablish populations of invertebrates such as butterflies and native bees whose services (e.g., pollination) are essential to natural ecosystem function. Currently, Toyon Canyon (former landfill) may be the best opportunity for this type of habitat creation in the park.

4.1.7 Lawns and picnic areas

Description: The extensive lawns, golf courses and picnic areas of Griffith Park are concentrated along the edges of the park, particularly along the eastern edge. Here, the once-seasonal Los Angeles River would run back and forth in braided channels between the hills of Eagle Rock and the lower slopes of Griffith Park, planting massive western sycamore trees and oaks. Today, these trees have been incorporated into the built landscape of the park, shading picnic benches and providing shade for golfers.

Ecological value: Augmented by a variety of planted, non-native trees, these greens offer habitat for a distinctive set of species, including mule deer moving down from the park's canyons, and support a bird community that includes the band-tailed pigeon, Cassin's kingbird and western bluebird year-round, joined by yellow-rumped warbler and white-crowned sparrow in winter. In summer, red-shouldered hawks build nests in the tallest sycamores, and bright-orange Bullock's orioles chatter from treetops.

Best Management Practices: The boundary areas between landscaped areas and natural habitat should be softened as much as possible to reduce "edge effects" (see section 6, below). As an example, avian nest predation has been shown to be significantly higher along abrupt, or "hard", ecotones than along more gradual ones (e.g., Suarez et al. 1997), so the creation of a gradient of plant succession, or establishment of native hedgerows (e.g., mulefat, willows) along habitat boundaries could help to soften these edges and create better quality wildlife habitat (RHJV 2004). Finally, the storage of garbage at the edge of these picnic areas adjacent to tracts of native habitat should be avoided where possible.

4.1.8 Plantations

Description: From its beginnings in the early 1900s, Griffith Park has been treated as a blank canvas onto which one's image of a park would be created. As many transplanted Los Angeles residents were homesick for Midwestern and Eastern forests, they set about transforming the park to more closely resemble the open spaces they left back home, with tree-lined paths and shady groves. Today, the tinder-dry patches of eucalyptus and pines are the consequences of

these efforts, even as citizen groups "adopt" corners of the park to plant still more non-native trees. The resulting forest – constructed atop native scrubland habitat - is largely a mix of eucalyptus and silk-oak from Australia and low-elevation conifers from the Mediterranean Basin.

Ecological value: In winter, montane bird species like mountain chickadee and golden-crowned kinglet drift down into these plantations from the San Gabriel Mountains and beyond, and eastern fox squirrels (introduced) scold each other from eucalyptus boughs. In spring and fall, blooming silk-oaks, bottle-brush and other eucalypts provide abundant nectar and insect food for hundreds of migrant hummingbirds and songbirds. Still, these plantations have done damage to some of the most sensitive scrubland habitats of the park (particularly those adjacent to the Los Angeles Zoo in the northeast corner), and have encouraged the spread of non-native insect and other pests which out-compete our unique native flora and fauna.

Best Management Practices: These plantations should be elminated from the park except where they hold cultural significance (e.g., Amir's Garden, Berlin Forest), and no new plantations should be established in the native habitat areas of the park. Restoration in the form of removal of these plantation trees should begin immediately; the least-dense groves and those with the most native vegetation in the understory should be targeted first, as these would presumably have the highest biodiversity value.

4.2 *Aquatic Habitats*

4.2.1 Los Angeles River

Description: Once flowing across wide, braided channels, the Los Angeles River through Griffith Park was confined to cement banks during the mid-1900s. Soonafter, a narrow band of willow riparian habitat developed along the bed of the Los Angeles River in two areas where the water table was too high to cement the riverbottom: near the I-5/134 Fwy. interchange, and downstream of Colorado Blvd. Wholly dependent on runoff from water treatment plants upstream, this permanently wet, partially-submerged habitat features a canopy of mid-sized willows and a dense understory of reeds and non-native weeds, notably the noxious giant cane (*Arundo donax*).

Ecological value: Three "priority" natural communities (CNDDB, n/d) occur along the river, Southern Willow Scrub, Southern Mixed Riparian Forest, and Southern Cottonwood-Willow Riparian Forest, an indication of the conservation importance of this habitat. Wetland species like western toad, two-striped garter-snake, and song sparrow are found in the willow scrub, while the cement channel floor supports flocks of migrant and wintering shorebirds, especially the black-necked stilt.

Best Management Practices: Many wildlife species associated with riparian wetlands also use adjacent habitats (Sabo and Power 2002, RHJV 2004), and this

movement should be facilitated. Wildlife-friendly connection between riparian habitat along the L.A. River and other habitats in the park's interior should be enhanced and/or established, including the culverts beneath the roadbeds and freeways on the northern and eastern edge of the park. The riparian habitat along the river channel should be augmented where possible by continuing to establish "pocket parks" along its edges, but not at the expense of remnant alluvial fan scrub habitat, which should be immediately identified and studied for preservation.

4.2.2 Lake Hollywood

Though not technically within Griffith Park, this large reservoir lies just to the west, and is used by most of the species found in the park, including the aquatic species of the Los Angeles River. Even less-studied biologically than the park, the reservoir is heavily-landscaped with non-native trees (esp. pines), but at least the forebay at the northwestern end supports a ring of freshwater marsh along its edge, which probably supports wetland species. We also presume the reservoir is also heavily-used by foraging bats of several species, at least seasonally. Finally, the lands just west of Lake Hollywood around Cahuenga Pass are probably critically important for wildlife movement in and out of the Griffith Park area, and deserve immediate attention and research.

4.3 *Urban Interface Zone*

While the natural habitat in Griffith Park is largely isolated from other natural open areas, the residential areas south and west the park do provide significant opportunities for wildlife to thrive, and many mobile species move freely back and forth between the park and the surrounding brushy slopes and canyons. Populations of certain adaptable species living in the park are likely augmented by populations residing in this interface zone; urban areas have been found to offer increased prey for raptors (Mannan & Boal 2004) and numerous denning and foraging opportunities for common species like raccoon, rabbit, skunk (Hoffman and Gottschang 1977, Broadfoot et al. 2001), and at least in the hills of southern California, for coyote. Previous research has shown secretive species have been documented as using cemeteries, public right of ways such as powerlines and railways, and other areas protected from development in urban areas (McKinney 2002, Seymour et al. 2006). Sears and Anderson (1991) found that native and even ornamental species planted in residential gardens led to an increased number of insectivorous birds, and Cooper (2002) documented extensive usage by certain native bird species in low-density residential areas in southeastern Los Angeles County.

However, for those species sensitive to human activity and habitat disturbance — or "urban avoiders" (McKinney 2002) — the urban development surrounding the park is inhospitable. Published studies document a greater than 50 percent overall loss of species richness for many wildlife taxa in urban cores when compared to surrounding rural areas (e.g., Denys and Schmidt 1998, Blair 2001, McKinney 2002). This should not be surprising as both plant diversity and amount of land vegetated have been shown to be correlated to wildlife species richness (e.g., Dickman 1987). What little vegetation remains in densely urbanized areas

often supports low species diversity because of the dominance of non-native, weedy species, trampling, pollution and other disturbances (McKinney 2002).

The residential areas of the Hollywood Hills may be thought of as a resource-rich, subtropical evergreen woodland; lawns, backyard fountains, and swimming pools provide year-round water, and pet food and garbage cans provides scavengers with an equally-available protein-rich diet. Many of the most successful "suburban" wildlife species are non-native (incl. eastern fox squirrel, house mouse), but adaptable native mammals also thrive, including scavengers like coyote, raccoon and striped skunk, as well as oak- and pine-dwelling taxa like western gray squirrel. Scavenging birds, including corvids like American crow, common raven and western scrub-jay are all familiar residents, as are raptors that feed on rodents and squirrels, such as red-tailed and Cooper's hawks, and great horned and barn owls. These raptors, in particular, may benefit from the mature trees used as landscaping throughout the hills; aside from scattered (planted) groves, tall trees are comparatively scarce in the interior of Griffith Park. Reptile and amphibian diversity is quite low in the urban interface zone, though the abundant western fence-lizard and the southern alligator-lizard are widespread here, as is at least one amphibian, the Pacific chorus-frog (all pers. obs.).

5. TARGET SPECIES

This section will provide information about specific wildlife species and their status in Griffith Park. As there has been little formal information collected on many species' status in the park, much of the information presented in this report is preliminary. Thus we present target species for different taxa for future monitoring to ensure wildlife health in the park.

These species were selected using a number of criterion, including their protected status within California, the effect they are thought to exert on the ecosystem, their historical decline in the region, and and on locally-specific recommendations by Martino et al. (2005). Obviously, including every species that fit any of these criterion would be unwieldy, so this section focuses only on a sampling of a much larger group, particularly those that might respond to habitat protection and enhancement and other management improvements.

Appendix II presents a complete annotated list of wildlife species known to occur in Griffith Park, and Appendix III summarizes areas of known or suspected occurrence by special-status species.

Target species categories:

1. Special-status Species: Those listed as threatened or endangered by either the state or national government. This is a political category; often but not necessarily reflective of local abundance/threat levels. See: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf

2. Environmental Indicator: Species that respond in a predictable and easily-observed manner to changes in their environment (McGeoch 1998). Continued persistence of these species in Griffith Park would indicate maintenance of acceptable natural habitat.

3. Keystone Species: Those that exert a "disproportionately large effect on other species" in their local environment (Meffe and Carroll 1994). These species presumably ensure natural ecosystem functioning in Griffith Park.

4. Umbrella Species: Easily-managed species through whose protection many other co-existing species' habitats are also protected, including sensitive species. (Zacharias and Roff 2001). These are usually animals with large and variable home ranges.

5. Rare Resident: Species found within the park and *not* in surrounding urban areas; these significantly add to the biodiversity of Griffith Park.

5.1 *Invertebrates*

Although this plan focuses on the vertebrate wildlife in Griffith Park, invertebrates play an invaluable role in nutrient cycling, the decomposition of organic matter, plant pollination, and soil formation. Additionally, invertebrates are the start of many terrestrial food chains. A study in San Diego county examining the effects of habitat fragmentation on arthropods in urban areas found that abundance and diversity was positively correlated with patch size (Bolger et al. 2000), indicating that Griffith Park is likely a significant resource for arthropods in the Los Angeles basin. With the exception of one brief survey (Bruyea 2003), we are not aware of any research conducted on invertebrate wildlife in Griffith Park. Bruyea (*Ibid*) conducted insect surveys, focusing on butterfly species, over the course of two days in June and July 2003. These surveys recorded 16 butterfly species, but also concluded that unseasonably cool conditions prior to the study may have affected the findings and listed a total of 70 butterfly species that could possibly occur in Griffith Park. Also noted, again with the same caveat of unseasonable conditions, was "conspicuously poor" hymenoptera (ant, bee, and wasp) diversity in the park. Of course, much more research is needed to gain a better understanding of invertebrate presence in the park, and the role they play in the park's natural ecosystem.

5.1.1 Behr's Metalmark (*Apodemia mormo virgulti)*

Reason for being a target: Environmental Indicator, Umbrella Species
Ecology: This small butterfly is found in various arid habitat including sage scrub and chaparral, where buckwheats (*Eriogonum* spp.) serve as caterpillar hostplant and major adult nectar source. One to two adult generations (flights) occur per year between March and September (Martino et al. 2005, Opler et al. 2006). This species has very specific habitat requirements, and is totally absent in urban/residential habitats, including much of the "urban interface zone" around the park. Therefore, it is probably a good indicator of high-quality scrub and a surrogate for other less easily-detected coastal sage scrub species.

Threats: Loss of habitat from urbanization, invasive weeds displacing larval hostplant (Martino et al. 2005).

Local Distribution/Status in Griffith Park: Rare to localized populations throughout its range from central California south to central Baja (Opler et al. 2006). Documented in Griffith Park in spring 2003 (Bruyea 2003). Several observed 2007 on slopes of Mt. Lee (D.S. Cooper, pers. obs.).

5.1.2 - Harvester Ants (*Pogonomyrmex* spp. and *Messor* spp.)

Reason for being a target: Keystone species
Ecology: Our local harvester ants are large, often reddish ants that favor warm, arid sites, where they typically occur in large colonies on bare patches of soil (CAS n/d). As their name suggests, their diet primarily consists of seeds they carry back to nests and stored in underground granaries; however, they will also collect other arthropods opportunistically (*Ibid*). Single queens establish new colonies, which reach maturity after c. five years (and produce winged, reproductive individuals), and persist for 10-15 years (Sanders and Gordon 2004).

Harvester ants are considered keystone species because of their influence on plant composition and because they are an important food source for ant-specialist animals (Suarez et al. 2000, Peters et al. 2005). They selectively disperse seeds, and their nest mounds create nutrient-rich soils for plant germination following colony extinction (Wagner et al. 2004, Peters et al. 2005). In areas where introduced Argentine ants (*Linepithema humile*) - which are not important seed dispersers - have displaced native harvesters, plant seeds are exposed to increased predation by other wildlife and destruction by fire, risking the decline of some plant species (Christian 2001, Carney et al. 2003).

Threats: A study in southern California found that harvester ants were among the most vulnerable native ant species to habitat fragmentation and Argentine ant invasion (Suarez et al. 1998). Argentine ants are limited by access to water, but are aided in the arid southern California environment by moisture sources around residential areas. Suarez (*Ibid*) found an association between Argentine ant activity and distance to the nearest urban edge, and report that they can follow anthropogenic disturbance such as roads deeper into habitat reserves.

Local distribution/Status in Griffith Park: Though ants have not been studied in the park, they are apparently widespread, particularly along fireroads through chaparral at higher elevations (D.S. Cooper, pers. obs.). Suarez et al. (1998) suggests that habitat reserves in coastal southern California can maintain native harvester ant populations at distances greater than 200 m from an edge, where Argentine ants cannot invade, indicating that Griffith Park may provide valuable habitat for harvester ants in the L.A. Basin.

5.2 *Amphibians and reptiles*

Although a small number of species are urban-tolerant and still common in the Los Angeles area given sufficient habitat in residential areas and parks, most snakes, lizards and amphibians in the Los Angeles area have experienced major population declines, particularly in the eastern Santa Monica Mountains and on the basin floor (Jennings and Hayes 1994, Longcore 2005). A preliminary study on herptile status in the park (Mathewson et al. 2007) indicates the widespread and common occurrence of only one species, the western fence-lizard; sightings of coast western whiptail (lizards) were made in three distinctly separate areas of the park; and the documented persistence of several other less common reptile species (Mathewson et al. 2007).

The names of herptile species below follows Stebbins (2003).

5.2.1 Coast Horned Lizard (*Phrynosoma coronatum*)

Reasons for being target: Special-status Species, Environmental Indicator, Rare resident (?).
Ecology: This lizard occurs almost exclusively in sandy or gravel soils within a variety of habitats, including scrub, open woodland, and riparian zones, into which it can burrow to avoid predation (Stebbins 2003). It primarily feeds on harvester ants, but will eat other insects if available. Horned lizards are diurnal most of the year, though some nocturnal activity documented in mid-summer (CNDDB n/d, MSHCP n/d). Little information is available on home range size, but Martino et al. (2005) reports a range of less than 100 meters, which could explain its precipitous decline in the region. Snakes and raptors are among its known natural predators, but domestic cats and dogs probably take a toll near urban areas. The horned lizard apparently experiences little feeding competition with other lizards because of its specialized diet (Pianka & Parker 1975, as cited in CNDDB n/d).

Threats: This species is highly sensitive to habitat disturbance, particularly urban and agricultural development (Stebbins 2003). Invasive Argentine ants promoted by residential development and landfills are a serious threat as they displace harvester ants, its primary food source (Stebbins 2003, Fisher et al. 2002). Horned lizard growth rate was found to be negatively affected by a diet of Argentine ants (Suarez et al. 2000, Suarez and Case 2002).

Local Distribution/Status in Griffith Park: Once (pre-1970) common in the San Fernando Valley and Los Angeles Basin, it is now quite scarce throughout its range because of habitat loss and invasion of Argentine ants outcompeting harvester ants, its preferred food source (Jennings and Hayes 1994, Suarez at al. 2000). Its status in Griffith Park needs to be determined, though scattered recent sightings by hikers and maintenance workers suggest it may persist, at least at high elevations in the interior of the park such as vic. Mt. Lee.

5.2.2 Arboreal Salamander (*Aneides lugubris*)

Reasons for being target: Umbrella Species (?), Rare Resident.
Ecology: This salamander is mainly found in oak and mixed oak forests, but does occur locally in chaparral. Strictly nocturnal, during wet periods it can be found under logs and rocks and in rock crevices or tree cavities. In dry periods, they may congregate around remaining moist areas (e.g., damp caves, tree cavities) or around artificial water sources (e.g. water tanks, wells). Its diet consists of small invertebrates and slender salamanders, and known predators include frogs, snakes, birds, and small mammals (Stebbins 2003, CNDDB n/d).

Threats: Loss of habitat. Stebbins (2003) remarks that cavities found in large oaks, used for nesting and habitat during dry summer months, are important for the persistence of the species. Though many amphibians are extremely susceptible to environmental pollution, the persistence of the Arboreal Salamander elsewhere in the Los Angeles Basin (e.g., the Whittier Hills, Haas et al. 2002) suggests that this may not be a threat for this particular salamander, and it may simply be scarce for other reasons, possibly limited by soil moisture.

Local Distribution/Status in Griffith Park: Though the last specimen record in Griffith Park is from 1922, this large salamander presumably still persists in the park (two animals have been found at the Los Angeles Zoo by staff in the past five years, *fide* I. Recchio). It has been recently documented in the nearby Whittier Hills, an ecologically comparable area with dense surrounding urban development (Haas et al. 2002).

5.2.3 Two-striped garter-snake (*Thamnophilus hammondii*)

Reasons for being target: Special-status species, Rare Resident (?).
Ecology: One of the aquatic garter snakes of California, this species is associated with riparian habitat other freshwater wetlands, but also occurs in scrub and oak woodland adjacent to these habitats (Jennings and Hayes 1994). Home range size varies by season, averaging 1500-3400m^2. This snake feeds on tadpoles, small fish and toads, fish eggs, and earthworms, and while primarily diurnal, it will become nocturnal in hot weather Taken as prey by mammals, birds, and other snakes; competition with other garter snakes uncertain (Stebbins 2003, CNDDB n/d).

Threats: Known areas of occurrence have declined markedly in response to urbanization and loss of riparian and freshwater habitat (Martino et al. 2005). Non-native habitat such as dense stands of giant cane (*Arundo donax*) continue to reduce habitat quality for it throughout its range.

Local Distribution/Status in Griffith Park: Once common, this snake has been eliminated from an estimated 40% of its historical range in California (Jennings and Hayes 1994). In the park it is known in modern times from a single specimen collected along the Los Angeles River channel in the early 1990s. It may persist in (or wash downstream into) suitable habitat the length of the channel, and possibly even occur in larger canyons such as Royce and Brush canyons

5.2.4 Coastal whiptail (*Cnemidophorus tigris stejnegeri*)

Reason for being target: Special-status Species, Umbrella Species.
Ecology: Whiptails are confined to large patches of coastal sage scrub and open chaparral, especially on gravelly soil; home range sizes 0.1-0.7 ha (CNDDB n/d). The whiptail is diurnal and is highly active; its diet includes insects, spiders, scorpions, and other lizards. Potential predators include snakes, birds, and larger lizards, if present (*Ibid*, Stebbins 2003). Our local race (*stejnegeri*) is recognized as a "Special Animal" by the California Department of Fish and Game, and is considered to be vulnerable to extirpation in the state (CNDDB n/d). Whiptails are rarely encountered in woodland, developed areas, and small patches of scrub surrounded by urbanization, and for this reason, they are a good indicator of large blocks of habitat.

Threats: Sensitive to habitat loss and urban disturbance. Hass et al. (2002) expresses concerns about mortality along roadways and dirt paths where bikers are present.

Local Distribution/Status in Griffith Park: The largest lizard in the Los Angeles area, this species is identified by its checkerboard pattern above, and is much less often seen than the western fence-lizard, the "default" lizard in the park. Whiptails are frequently seen in the open scrub of lower Brush Canyon, and on south-facing slopes east of the Griffith Observatory. Mathewson et al. (2007) also documented its presence high on the slopes of Spring Canyon, and on ridges around Mt. Chapel. In the park, they co-occur with several scarce scrubland wildlife species, including the Rufous-crowned Sparrow and butterfly species in the metalmark and blue families.

5.2.5 Silvery Legless Lizard (*Anniella pulchra pulchra*)

Reason for being target: Special-status species, Rare Resident (?)

Ecology: Most often associated with coastal dune, chaparral, coastal shrub, and hardwood forest habitat, legless-lizards prefer areas with sandy or loose soil and abundant leaf litter for burrowing (Stebbins 2003, CNDDB n/d). They follow a diurnal activity pattern, foraging under leaf litter and fallen woody debris, but will come to surface at dusk or at night to feeds on insect larvae, insects, and spiders. Their known predators include alligator lizards, snakes, birds, and small mammals (*Ibid*).

Threats: Land conversion, invasive plant, and urbanization contribute to significant habitat loss; trampling and mortality from other human activities are also a concern (Stebbins 2003).

Local Distribution/Status in Griffith Park: Unknown. Last known specimen from the Griffith Park area is from 1965 (Appendix II), but recent reports from locals (to DSC) suggest it may perisist in sandy soil along the Los Angeles River near the horse stables in Burbank and at the Dept. of Water and Power's Headworks site, adjacent to the park's northern border.

5.2.6 San Bernardino ringneck snake (*Diadophis punctatus modestus*)

Reason for being a target: Special-status species.

Ecology: Our local taxon is found in a wide variety of habitats, including grassland, woodland, chaparral, riparian, and woodland habitat; prefers moist and rocky areas (Stebbins 2003, CNDDB n/d). Seldom found in open areas, spending most of it time in leaf litter or under rocks and woody debris. Slender salamanders an important prey item; other prey include other salamanders, tadpoles, frogs, lizards, small snakes, insects, slugs, earthworms Predators include larger snakes, diurnal birds, and some small mammals (*Ibid*).

Threats: Loss of quality habitat, persecution a major threat for many snake species.

Local Distribution/Status in Griffith Park: This snake is presumed present in Griffith Park, even though the last known specimen record from the park was from 1959. It has been recently documented having a limited distribution in the nearby Puente Hills, an ecologically comparable area with dense surrounding urban development (Haas et al. 2002), as well as in even smaller Debs Park northeast of downtown Los Angeles (D.S. Cooper, unpubl. data). In both areas, it co-occurs with the relatively common black-bellied slender-salamander, which still occurs Griffith Park.

5.1.3. *Birds*

Birds are among the most numerous and conspicuous wildlife species in the park, and because of the rich species diversity present year-round, make ideal candidates for ecological monitoring. Of the roughly 200 species that have been recorded in the park (http://www.friendsofgriffithpark.org/GPNHS/Griffith.htm), about 150 are regularly-occurring, known to be present every year. These are presented in Appendix II. Of these 150 species, about 50 breed/nest regularly, raising young mainly during spring and early summer. Around 45 regular species occur only in winter, and around 25 are transients that predictably stop in the park to refuel during spring and fall before continuing their migration. Around 60 species are year-round residents in the park, engaging only in limited movement through the year.

Birds occur in all habitats, though the diversity of species on any given day may be highest along vegetated portions of the Los Angeles River channel; canyon bottoms and even large picnic areas also support several dozen species throughout the year. A number of bird species in the park are largely absent from the surrounding urban landscape, including many resident scrubland species (e.g., California quail) and even certain migrants like the blue-gray gnatcatcher.

5.3.1 California Quail (*Callipepla californica*)

Reasons for being target: Environmental Indicator, Umbrella Species, Rare Resident.
Ecology: Once common throughout the Los Angeles area (Grinnell 1898), quail are now localized in the eastern Santa Monica Mountains, and confined to the largest patches of open space. They are therefore good indicators of habitat connectivity (like mule deer, below). Within these large patches, their habitat requirements are relatively simple and flexible - a reliable source of water, and dense cover to allow for safe roosting. Quail are insectivores and herbivores, feeding on seeds through the winter, and they nest on the ground, incubating a dozen or more eggs per clutch (Ehrlich et al. 1988).

Threats: Quail are known to be highly-sensitive to local extinctions in urban southern California, and are unlikely to recolonize areas once extirapted (Crooks

et al. 1997). They are vulnerable to collisions with vehicles and attacks by domestic cats. Their eggs are also eaten by urban-adapted, scavenging mammals such as skunks and raccoons, and therefore are especially dependent on roadless areas of the park's interior.

Local Distribution/Status in Griffith Park: Quail are found throughout the park but appear to be most common along the western edge of the park, particularly around the Hollywood Reservoir (D.S. Cooper, pers. obs.); however, quantitative surveys have yet to be performed to identify concentration areas. Large, densely vegetated canyons appear to be especially important for this species, and Griffith Park appears to be an important core population area for quail in the eastern Santa Monica Mtns.

5.3.2 Oak Titmouse (*Baeolophus inornatus*)

Reasons for being target: Environmenal Indicator, Umbrella Species

Ecology: As its name would suggest, the Oak Titmouse is tightly connected with oak woodland, rarely occurring far from these trees. Titmice nest in cavities (often those hollowed-out by the Nuttall's Woodpecker) during the spring, and occur in the same oak groves year round. Totally non-migratory, they are among our the most sedentary birds, and are therefore especially vulnerable to local extinction and are probably incapable of colonization across unsuitable habitat.

Threats: In the Los Angeles area, Oak Titmouse appears to be vulnerable to fires; they were extirpated from the nearby Whittier Hills after a massive fire in the late 1960s (Cooper 2000). Though resident in the more wooded suburbs around Los Angeles (e.g., Altadena), they are also absent from habitat patches far from large blocks of habitat that presumably provide dispersing birds. Though not protected by any laws, they are considered by the National Audubon Society to be on the "WatchList" of decling species, based on trends in summer and winter bird surveys.

Local Distribution/Status in Griffith Park: The Oak Titmouse is widespread in Griffith Park, and currently occurs in all major canyons of the park, as well as in mature chaparral and in larger sycamores around picnic areas.

5.3.3 Wrentit (*Chamaea fasciculata*)

Reasons for being target: Environmental Indicator, Umbrella Species.

Ecology: One of the loudest birds for its size, the Wrentit's song, a descending, ping-pong-ball trill, is considered the "sound of the chaparral" by hikers in California. Because this song is given year-round (i.e. outside the breeding season), and

because this species is essentially depended on native scrub (including chaparral and coastal sage scrub) habitat for its existence, the Wrentit is an excellent indicator species for ecological monitoring in Griffith Park. Birds are almost always found in pairs, and though they usually keep low in vegetation, will ascend to the crowns of tall fruiting shrubs (incl. Mexican elderberry, toyon) in season, and occasionally forage in the dense canopy of oaks.

Threats: Based on its abundance in the park and the Santa Monica Mtns., the Wrentit is apparently thriving here. It may be, however, seriously threatened by fire; early data from 2007-08 bird surveys indicate a total abandonment from the burn zone in the park, meaning it may have suffered a 20% reduction in population size from this burn. Tree-planting and the development of picnic areas and other built features would be expected to negatively impact this species, as it cannot utilize non-native vegetation.

Local Distribution/Status in Griffith Park: Currently, the Wrentit is common and widespread in the park, away from built areas, except within the burn area. It is absent from the Los Angeles River channel (*fide* M. San Miguel), though it occurs in riparian habitat elsewhere in the region. The 2007 fire probably may have reduced the total population of this and other resident chaparral species by c. 20%.

5.3.4 Canyon Wren (*Catherpes mexicanus*)

Reasons for being target: Rare resident.
Ecology: The Canyon Wren is a sedentary species that spends its entire life on steep, rocky slopes, often above streams, where it plucks insects from niches in the stone, and builds its stick-nest each spring within rock crevices. Its descending song is distinctive and far-carrying, and may be given year-round (though most often in the spring/summer).

Threats: The Canyon Wren appears to be holding its own in the Los Angeles region, probably because of its ability to thrive in inaccessible slopes not reach-able by typical recreationists. Birds are common in the lower canyons of the San Gabriel Mtns. (e.g. along the Millard Cyn. trail, pers. obs.), but this is probably because there is so much of this habitat there; in Griffith Park, suitable habitat may be restricted to a tiny area of Bee Rock, the only large rock outcrop in the park. Any increase in recreation on and around Bee Rock could negatively affect this species.

Local Distribution/Status in Griffith Park: The population size of the Canyon Wren in the park is probably miniscule, limited to at most one pair of birds at Bee Rock ("discovered" in late 2007, pers. obs.); this species formerly occurred (with the ecologically similar Rock Wren) at the Bronson Caves (K.L. Garrett, unpubl. data), but both species have since abandoned this site.

5.3.5 Yellow Warbler (*Dendroica petechia*)

Reasons for being target: Special-status Species; Ecological Indicator, Umbrella Species, Rare Resident.
Ecology: The Yellow Warbler spends each spring and summer in the willow riparian woodland throughout the state, but this habitat is typically spotty, and subject to clearing for flood-control purposes. Arriving on breeding territory by April, it builds a small nest of plant fibers high in willows, and can be nearly impossible to detect when not vocalizing. Fortunately, its loud, squeaky, warbling song carries well, and therefore one can easily estimate the number of pairs at a given site. This species, like the Wrentit, is closely tied to native vegetation, and since it requires the presence of a lush understory of native shurbs (e.g., stinging nettle, sandbar willow), it does not breed in urban or even suburban situations, even if tall trees are present. Many other riparian bird and animal species tend to occur where Yellow Warblers are breeding, including the Song Sparrow, American Goldfinch, Lorquin's admiral (butterfly), Pacific chorus-frog, etc.; for this reason we consider it an "umbrella species".

Threats: The parasitic Brown-headed Cowbird, which lays its eggs in other birds' nests, may represent the most serious threat to this species' existence in the state (RHJV 2004). Vegetation clearing, particularly in lowland California near urban and agricultural areas, remains a threat, as cleared riparian woodland can take several years to regain the stature and canopy density needed to support this species.

Local Distribution/Status in Griffith Park: Currently, the Los Angeles River channel provides the only habitat for the Yellow Warbler in the park. It is hoped that with improved habitat management in some of the larger canyons (e.g., Brush and Western) this species can also be enticed to return to nest in sycamore woodland elsewhere in the park, as it does in the western Santa Monica Mountains.

5.3.6 "Ashy" Rufous-crowned Sparrow (*Aimophila ruficeps canescens*)

Reasons for being target: Special-status Species, Rare resident.
Ecology: This tiny songbird spends nearly its entire life foraging on steep, rocky slopes amid patches of low native shrubs and grass. During spring, males sing weakly from boulders or low shrubs while their mates stealthily incubate eggs in the dense scrub below.

Threats: This sparrow is able to survive in fairly small habitat fragments and is not believed to be affected by proximity to the urban edge provided appropriate habitat is present (Morrison et al. 2004), and its tolerance of non-native grassland means that it would be expected to withstand the frequent wildfires that would eliminate other species of plants and animals. However, it tends to avoid areas with planted trees, preferring open, low-profile vegetation with only boulders or scattered chaparral shrubs the highest features. Since the entire global range of our local race (*canescens*, considered a Bird Species of Special Concern by the State of California), is confined to southwestern California, it is especially important that places where it still common, such as Griffith Park, remain suitable habitat.

Local Distribution/Status in Griffith Park: Surveys in 2007 (D.S. Cooper, unpubl. data) revealed this sparrow to be present in small numbers in three areas of the park: the belt of coastal sage scrub from Western Canyon east to Aberdeen Canyon (which, unfortunately, burned in May 2007); the high ridges above upper Brush Canyon, including the slopes of Mt. Lee; and in coastal sage scrub just west of the L.A. Zoo. Still, the total population of this bird in the park may be fewer than 20 pairs.

5.3.7 Red-winged Blackbird (*Agelaius phoeniceus*)

Reasons for being target: Environmental Indicator, Umbrella Species.
Ecology: These blackbirds are highly-social and nest in freshwater marshes and wet grassland (incl. pastures and meadows), where they build nests of reeds and grass just above the water's surface and raise their young. In Griffith Park, these striking birds are confined to the Los Angeles River, where they breed locally in patches of marsh along the channel-bottom.

Threats: Redwings are extremely resillient to predators, and and very quick to colonize new habitat areas, often appearing just days after reeds become established. They are also noisy and easily-surveyed, making their presence a surrogate for several other less-conspicuous marshland species (incl. Common Moorhen, Sora, Marsh Wren) with which they often co-occur.

Local Distribution/Status in Griffith Park: Their numbers are probably highly variable, dependent on the amount of rain and configuration of vegetation in the channel; areas of marsh along the Los Angeles River tend to form where water is too deep for shrubs and trees to take root, but where enough silt has accumulated to anchor the reedbeds.

5.1.4. *Mammals*

A preliminary study of large mammals in the park indicated substantial populations of coyotes, raccoons, striped skunks, mule deer, and rabbits (presumably Audubon's cottontail)

in Griffith Park (Mathewson et al. 2007). Local detections of bobcats, gray foxes, and Virginia opposums were also made; Mountain lion has been reported in the park on occasion, but were not detected by Mathewson et al. (*Ibid*) and not considered to be permanent residents. Much more information is needed about the status of small mammals that may occur in the park, including long-tailed weasels, bats, and most rodents.

5.4.1. San Diego desert woodrat (*Neotoma lepida intermedia*)

Reason for being target: Special-status Species, Rare Resident (?)
Ecology: This specialized native rodent is most common in arid chaparral, coastal sage scrub, and desert/cactus habitat, but seems to prefer rocky areas. Its home is small (<0.04 ha), and it utilizes dense shrub, cacti, and rock crevices for denning. Mainly nocturnal, this woodrat feeds on leaves, seeds, berries, flowers, and shoots; in coastal scrub, oak, chamise and buckwheat are preferred food sources. Its known predators include snakes, owls, and carnivorous mammals (MSHCP n/d, CNDDB n/d).

Threats: Habitat loss and fragmentation are its greatest threat, as. it may not be capable of dispersing between suitable habitat patches (MSHCP n/d)

Local Distribution/Status in Griffith Park: Presumed present in Griffith Park (specimen records from 1997, Appendix II), this mammal is most likely to occur in rocky, cactus-rich sites (M. Long, County of Los Angeles, via email), and not the chaparral favored by its more common relative, the dusky-footed woodrat (*Neotoma macrotis*), also present in the park.

5.4.2 Westerrn mastiff bat (*Eumops perotis californicus*)

Reason for being target: Special-status species, Keystone species, Rare Resident(?)
Ecology: Bat species are valued for their unique role in nocturnal insect control, but just as importantly, they are indicators of environmental pollution (e.g., Agosta 2002). This species is associated with a variety of open habitat types in arid to semi-arid environments; *E. perotis*, the largest native bat in the U.S., is restricted to areas with significant rock features - particularly "exfoliating rock slabs (e.g., granite, sandstone, or columnar basalt)" (Pierson 1998, as cited in Stephenson and Calcarone 1999) to support colonial cliff-roosting (Remington 2006, CNDDB n/d). Highly nocturnal, *E. perotis* appears to be a fast-flying moth specialist (*Ibid*). Predators of these species include owls and snakes (CNDDB n/d), but it is not known whether these are major threats at Griffith Park.

Threats: Unknown.

Local Distribution/Status in Griffith Park: Status is Griffith Park unknown; *E. perotis* was collected in "Hollywood" in 1991 (see Appendix II). Though this species, like many bats, has experienced significant population declines in southern California, it has been documented, albeit at low densities, in the nearby Puente Hills, an ecologically similar area, since 2004 (Remington 2006). Given its roost habitat preferences, it should be searched for at rock outcrops on the slopes above Royce Canyon, among other places.

5.4.3 Western gray squirrel (*Sciurus griseus anthonyi*)

Reason for being target: Environmental Indicator.

Ecology: Recognized as "sensitive" by the U.S. Forest Service, and in some areas considered an indicator species for oak forest communities (Linders and Stinson 2006), this squirrel is found in a variety of conifer and hardwood forests but is typically closely associated with oak forests (CNDDB n/d). Its home range sizes vary, ranging from 0.5 ha in a California city park to 73 ha in a Washington state wildlife area (US EPA 2003). Western gray squirrels are diurnal, and primarily arboreal, avoiding open areas and foraging on the ground near trees (*Ibid*). They nest in tree canopies, hollows, and snags, and will opportunistically feed on a variety of plant matter and fungi (Linders and Stinson 2006, CNDDB n/d). Its predators include coyotes, foxes, bobcats, hawks, and owls.

Threats: Concern over the loss of oak habitat and competition with introduced species, especially Eastern fox squirrels, is mounting; listed as a threatened species in Washington state (Bayrakçi et al. 2001, Linders and Stinson 2006).

Local Distribution/Status in Griffith Park: This squirrel is still present locally in the park, invariably within a few feet of its preferred oak woodland habitat. It also utilizes planted pines where oaks are scarce (e.g., vic. Mt. Hollywood, pers. obs.). Individuals persist in all major canyons in the park (D.S. Cooper, unpubl. data), though the total park population size, and the impact of the introduced Eastern fox squirrel, is not known at this time.

5.4.4 Mule deer (*Odocoileus hemionus californica*)

Reason for being target: Environmental Indicator, Keystone Species, Umbrella Species.

Ecology: The mule deer is the only large herbivore present in Griffith Park, and is as good as any for indicating habitat connectivity, as deer are highly-visible and yet unable to penetrate very far into the urban interface zone, keeping within about 50 meters from native vegetation and large open space blocks. Like the

white-tailed deer of the East, the mule deer prefers habitat mosaics with a dense cover for shelter and open grasslands, shrub and chaparral for foraging; but unlike the suburban-adapted white-tailed deer, ours reaches its highest densities in undeveloped oak woodlands and riparian areas (CNDDB n/d, Penrod et al. 2006). Recent size studies from two sites in southern California found mean home ranges sizes of between 49-664 ha (Kie et al. 2002). Mule deer are crepuscular, and as browsers and grazers, they feed on shrubs, forbs, grasses, leaves, acorns, and mushrooms. They frequently visit salt and other mineral licks when available (CNDDB n/d). Their rutting season occurs in the fall, when individuals disperse, and fawning peaks in late spring; twins are common after the first fawning (*Ibid*). In the Santa Monica Mountains, their primary predators is the coyotes and, at least for fawns, bobcat (*Ibid*).

Threats: Mule deer require large tracts of land and are sensitive to habitat loss and fragmentation from urban development. Fragmentation by roads is a particularly serious problem with thousands of deer killed in vehicular collisions annually in the U.S. (Penrod et al. 2006).

Local Distribution/Status in Griffith Park: Mule deer are one of the most commonly seen native mammals in Griffith Park, and are frequently observed on or around the park's golf courses. Mathewson et al. (2007) found mule deer to be widespread throughout the park during a two-week period in June 2007. A similar urban nature reserve in Orange county also found mule deer to be easily detectible despite high levels of human activity (George and Crooks 2002). Their favored rutting and fawning sites within the park are not known.

5.4.5 Bobcat (*Lynx rufus*)

Reason for being target: Environmental Indicator, Rare Resident.
Ecology: In some areas, bobcats are keystone species which may serve to maintain sustainable populations of prey species, particularly rabbit and rodents; however, in Griffith Park, this role is undoubtedly occupied by the coyote. Still, the bobcat is sensitive to habitat fragmentation and disturbance (like the mule deer), and serves as an indicator of high-quality wildlife habitat and of habitat connectivity in a semi-urban environment (Crooks 2002, Martino et al. 2005). Bobcats frequent rocky areas with dense brush or tree cover, and though primarily carnivorous (mainly rabbits and rodents), they also consume fruit and even grass. Bobcat are least active during the day; an Orange County study found bobcats to shift activity times to become more nocturnal in areas of high human use (Neale and Sacks 2001, George and Crooks 2006). Their mean home range sizes in unfragmented southern California habitat are large, reported as 149.8 ha and 125.5 ha for male and female bobcats, respectively (Tigas et al. 2002).

Threats: Habitat disturbance and fragmentation; females are particularly sensitive (Riley et al. 2003). Vehicular collisions are a significant cause of mortality in urbanized areas (*Ibid*).

Local Distribution/Status in Griffith Park: Bobcat are apparently resident in small numbers in and around Griffith Park; dens have been noted in two areas, both of which feature rocky overhangs on north-facing slopes above a brushy stream (Royce Canyon and an unnamed canyon near the Boy Scout camp; D.S. Cooper, unpubl. data). Over a two week period in June 2007, Mathewson et al. (2007) recorded bobcat tracks in and around Griffith Park's Spring Canyon, Royce Canyon, and Mt. Chapel, as well as along the Rattlesnake trail. While great horned owls may take young bobcats and both mountain lions and coyote occasionally kill adults (CNDDB n/d, Martino et al. 2005), bobcat numbers are probably limited by disturbance and collisions with cars rather than by predation, at least in Griffith Park.

5.4.6 Coyote (*Canis latrans*)

Reason for being target: Keystone Species.
Ecology: Coyotes are incredibly adaptable, are found in just about any habitat, and have proven to be quite urban adaptive as well (CNDDB n/d, Riley et al. 2003). A study in the Santa Monica mountains found that coyotes were detected in 8 of the 9 habitat types studied, and were most frequently found in somewhat disturbed habitats, including walnut woodland, grassland, and developed areas (Fedriani et al. 2000). Home range size is quite elastic and highly variable depending on food abundance and development (Gehrt 2004). A study in and around the Santa Monica Mountains National Recreation Area immediately north of Griffith Park found that home range sizes varied between 125-324 ha (Tigas et al. 2002); however, urban-dwelling coyotes are thought to have much small home ranges. Coyotes use cavities of any kind for denning, including rock cavities, hollow trees and logs, caves, and even storm drains. Coyote diets in the Santa Monica Mountains was found to be diverse, but primarily carnivorous, with rodents and rabbits the most important prey items; fruit, particularly toyon and elderberry, are also important components. Coyotes are thought to play an important role in keeping numbers of mid-sized predators in check (Crooks and Soule 1999, but see Elmhagen and Rushton 2007), and so are included here as a keystone species.

Threats: Few if any in the park; coyote presence and abundance has been shown to decline with habitat patch size and isolation (Crooks 2002), but this is not an issue in Griffith Park. Coyote populations in southern California are thriving, and are probably not limited by predators. An foreseen pathogen, perhaps transmitted by domestic dogs, could in theory limit coyote population size.

Local Distribution/Status in Griffith Park: A preliminary study of carnivore presence in Griffith Park found coyote to be widespread and easily detectable throughout (Mathewson et al. 2007).

6. WILDLIFE MANAGEMENT GOALS

Wildlife in the park perform services crucial to maintaining the park's natural environment such as pollination, seed dispersal, post-fire recovery and pest control; they are also essential to monitor environmental quality, and the presence of natural features such as oak trees and undeveloped canyons and even wildlife itself can help raise property values in the area (Conover 2002). To ensure maintenance of wildlife diversity in Griffith Park, there must be a sufficient amount of quality habitat in the park, and this habitat must be actively managed to stop the continued degradation. Los Angeles Dept. of Recreation and Parks management may find that current staffing assignments are insufficient to ensure adequate stewardship of Griffith Park resources, and may wish to create a division of natural resources within the deparment with trained biologists and land managers, as exists at many large parks departments around the country (and as suggested by Griffith Park Master Plan "Redraft", *op cit.*). Griffith Park stands as a truly remarkable reserve of relatively undisturbed natural habitat surrounded by intense urbanization. However, given continued degradation and without protection of its natural resources, many wildlife species now present may vanish from the park in the future.

6.1 *Promote native wildlife populations and habitat*

6.1.1 Identify and defend native vegetation and biological "hotspots"

Wildlife species diversity is dictated by the diversity of native plant species, structural complexity of (native) vegetation, and abundance of other natural features (Miller 2000). While exotic plant species may add to a site's plant species richness (total number of species), they degrade overall habitat quality and have a profound impact on natural systems. Exotic species often are not subject to natural controls, as many insects and herbivores find them inedible or unpalatable. In the absence these controls, exotics displace native species, often outcompeting natives for the same resources. With fewer resources available to them, native insect numbers also decline, resulting in cascading changes along the foodchain.

The threat from non-native species is considered a serious challenge in urban conservation, and ample literature exists on this aspect of land management and restoration (McKinney 2002). Complete lists and maps of non-native plant species in the park are being developed (R. Fisher, City of Los Angeles, pers. comm.), and restoration projects involving the removal of the most aggressive and invasive species should be a priority. Plants present in culturally-significant overlooks and garden areas (e.g., Amir's Garden, Berlin Forest) should be assessed in terms of their invasiveness of their species, and their threat level to surrounding wildland habitat. Of course, not all exotic species are invasive, and many can co-exist within confined areas without posing a threat; still, appropriate and effective methods of controlling invasive and non-native species in Griffith Park should be carefully researched and employed where possible.

Within native habitats, snags and fallen trees should remain in place (where not a threat to public safety) to provide habitat and to naturally decay, and understory growth should be promoted. Where appropriate, portions of lawn and picnic areas could be left unmown, particularly in the fall when producing seed, promoting use by birds, pollinating insects, and small mammals. Examples would be leaving an unmowed grass border between natural vegetation and adjacent landscaped areas like playing fields or picnic areas (Miller 2000).

As a better understanding of wildlife in Griffith Park is achieved, important habitat resources for wildlife will be identified and mapped, including sensitive species habitat (or potential habitat), breeding and (for birds) wintering sites, sites with exceptional native species richness, and biological corridors. Rare and important systems like wetlands, alluvial fan scrub, and riparian woodland in various canyons and along the Los Angeles River, essentially all of it habitat for special status species, should be defended and enhanced through restoration efforts. So too should particularly robust examples of the park's major vegetation types (e.g., oak woodland, coastal sage scrub). Key animal breeding sites, including raptor nests and bobcat denning areas (where known) should be identified by qualified biologists and volunteers, and protected from inappropriate recreational activity, particularly during sensitive times of the year.

6.1.2 Clarify location and usage of wildlife corridors

The vast majority of individual mammals, herptiles, non-migratory birds, and invertebrates of the park can live their whole lives within Griffith Park and/or the adjacent open space, and do not or cannot leave. Their offspring may disperse only into the next drainage or ridgetop, or, in the case of certain amphibians and butterflies, only a few steps away within the same canyon. However, wider-ranging species, such as deer, coyote and bobcat, presumably require corridors through which to travel to other nearby habitat, for dispersal of young raised in the park, to facilitate immigration of new individuals into the park to increase variety in the gene pool, and to regulate numbers of prey (= "meso-predators") within given habitat blocks (see Crooks and Soule 1999). Populations made up of individual animals that cannot enter or leave the park may become inbred and suffer biological consequences culminating in their eventual extrirpation from the park (see: http://www.scwildlands.org/). Already, mule deer have been lost from nearby Elysian Park and Debs Park (D.S. Cooper, pers. obs.), presumably because of their isolation combined with their small size (<500 acres of natural open space).

Though coyote and deer roam widely within the park and the urban interface zone, the amount of movement west into the larger Santa Monica Mountains is unknown. Given the large size of the open space in and around the park (5000+ acres) and the fact that this habitat has been isolated from the rest of the Santa Monicas for over four decades, it is very possible that extremely limited or no wildlife movement west current takes place, and that the current wildlife community - in terms of numbers and species diversity - has reached an equilibrium. Therefore, monies spent improving imagined (by us) corridors without prior documentation of their usage (or attempted usage) might be better spent improving habitat with the park itself.

However, we know that coyotes use rights-of-way under power lines and along railways (Riley et al. 2003, Tigas et al. 2002, Way et al. 2004), and several mammal species regularly move across busy roads via highway underpasses and overpasses. Longcore (2006) reports coyotes using the cement, high-walled Los Angeles River channel to travel from the western San Fernando valley to the Sepulveda Basin, the channel apparently mimicking natural drainages traditionally used by these large mammals. And, since many animals are naturally attracted to water, it stands to reason that connections between the park's uplands and the Los Angeles River channel would be desirable.

In an analysis of potential mammal movement corridors within California, Penrod (2000) identified three categories of linkages:

- Landscape Linkages (connections between large blocks of "core" habitat that themselves support self-sustaining populations)
- Connectivity Choke-Points (narrow/tenuous routes of open space connecting two habitat blocks)
- Missing Links (barriers to dispersal, such as sections of roads and highways).

Assuming that deer and other large/ mid-sized mammals easily move through the low-density residential areas of the Hollywood Hills, we consider the entire matrix of undeveloped parkland and the surrounding "urban interface zone" as a single large open space block. West of here, the bulk of the eastern Santa Monica Mtns. between SR-101 to I-405, could be considered one large "Landscape Linkage" between the Griffith Park block and the vast open space of the central Santa Monica Mtns. west of I-405 (assuming this linkage is even used by mammals in the park. Clearly, studies are needed to confirm/clarify this.

Obvious potential "Connectivity Choke-Points" affecting Griffith Park would include several over- and underpasses at SR-101 in the Cahuenga Pass which connect the park with the western Santa Monica Mountains, as well as culverts under SR-134 and I-5, which may be used by animals moving from the park into the Los Angeles River channel (and thus into the larger Los Angeles Basin/San Fernando Valley). Future management activity could involve working with public agencies and local residents to study these key crossings and document actual usage, and then to ensure safe crossing via appropriate fencing, use of street lights, and/or modification of vegetation as screening along the routes taken by wildlife. At least one overpass in the Cahuenga Pass (at Lakeridge Ave.) is still lightly-developed and is minimally affected by light pollution (pers. obs.).

Obviously, certain built features at the edge of the park have resulted in "Missing Links", or barriers to the dispersal of mammals at the borders of the park, and could also be modified to reduce mortality and human-wildlife conflict. Examples would include places where drainages run directly from the park/open space into busy roadways (e.g., Forest Lawn Dr.), or into residential neighborhoods where vulnerable to edge effects and other conflicts (e.g., Brush Canyon; see 6.5, below).

6.1.3 Identify restoration priorities

Several sites within Griffith Park are critically important for wildlife, and yet have been seriously degraded by years of neglect or human use. For people and wildlife to coexist, care must be taken to ensure that vegetation does not get trampled by hikers and dogs, that trash is not strewn about and is kept out of streams, and that activities that cause degredation are contained and limited. Urgently needed are appropriate fencing around sensitive areas (Fig. 2), informative signage, and perhaps most importantly, a public education effort using docents and/or volunteers to communicate with the park users on the need to preserve and respect these habitats.

Long-term, park-wide projects that would most benefit wildlife include the restoration of natural drainages (incl. the removal of non-functional debris basins and recontouring and re-vegetating streambanks), the enhancement of native scrub through selective non-native tree

removal (esp. eucalyptus) and invasive weed control. More ambitious projects, such as habitat creation and restoration along the Los Angeles River and atop the Toyon Canyon Landfill would obviously entail years of planning and significant community and public agency involvement.

Appendix III provides a summary of threats to major habitat areas of the park, organized into subregions.

Fig. 2. Example of solid, naturalistic (wooden) fencing between a habitat restoration area and road at Debs Park (in Highland Park, Los Angeles). Photographed Jan. 2008 by Daniel S. Cooper.

Sites most in need of management attention include (see website for photos and locations):

6.1.3.1 Lower Brush Canyon

Also known as Bronson Canyon, this is one of the few naturally perennial streams in the park, and one that supports a vibrant plant and animal community. It is also among the most popular hiking and dog-walking trails in the park, made even more so since the closures due to fires in 2007, and the city leash law is completely unenforced. Currently, the stream bed is being seriously trampled, particularly just upstream of the picnic area. Large blocks of cement debris have also been dumped into this stream, and the vegetation on the sides of the creek has almost been totally eliminated. Improper disposal of garbage within the picnic area has resulted in a large colony of California ground-squirrels dependent on

trash, a potential vector for human and wildlife disease. Upstream, numerous exotic (non-native) plants are choking out the native vegetation along the creek.

6.1.3.2 Western Canyon

This drainage includes the man-made Fern Dell garden area, but upstream, Western Canyon is a natural streambed that has withstood years of abuse. Transients have established camps in the bushes along the two main tributaries flowing down from the east (originating near the Griffith Observatory), and their drug use and prostitution is a major source of garbage, trampling, and fire. The city leash law is totally unenforced, as it is throughout the park. The streambed vegetation has been largely denuded of native vegetation within the mainstem of Western Canyon, and illicit trails have resulted in a lack of clear direction on where to hike. Numerous non-native trees, including eucalyptus and silk-oak, clog the stream bed, stealing resources from the native sycamores, California bays and oaks, which are the key to the health of native woodland wildlife community here. A large colony of rats and California ground-squirrels is present here, feeding from 30+ garbage bins stored on the floor of the canyon, adjacent to a large block of wildland habitat (see Fig. 3, above).

6.1.3.3 Spring Canyon

Years ago, Spring Canyon, a tiny, perennial stream emerging from the base of Bee Rock and flowing east toward the Los Angeles River, was lined with cement and rock. Today, the vegetation along the canyon bottom is deprived of water (blocked by cement), but is otherwise is decent shape. Upstream of the picnic area, old check dams were installed, presumably to slow water flow, but today, they are silted-in and serve only to encourage weeds like black mustard and castor bean. Massive sycamores here attest to the potential of Spring Canyon to support a native riparian ecosystem, which could be encouraged by the removal of the cement lining of the stream, including the old check dams.

6.1.3.4 Fern Canyon

Once the site of a popular nature trail and modest amphitheater built by Boy Scouts, Fern Canyon was ravaged by the 2007 fire, which took out most of the wooden stairs, foot bridges, and amphitheater seats. Rehabilitating Fern Canyon should be done with an eye toward maintaining the integrity of the natural resources while providing a high-quality learning experience for park visitors. Fern, like Brush and Spring canyons, also features rare perennial water in an otherwise arid park, and (at least until the May 2007 fire) supports large numbers of birds, mammals and even amphibians. It is also highly accessible to the public, located adjacent to the Merry-Go-Round parking lot minutes from Interstate 5. Lower Fern Canyon is "ground zero" for wildlife (coyote) feeding in the park, with up to 5 cars present every day offering a variety of human food to a pack of coyotes (Fig. 3, above).

6.1.3.5 Coolidge Canyon

Tucked away in the southeastern corner of the park (and with no signage or designated parking), Coolidge is notable as supporting both of what are perhaps the finest example of oak-riparian ecosystem and black walnut woodlands in the park (though affected by the May 2007 fire), as well as a permanent water source, which is augmented by urban run-off. The post-fire ecosytem is rebounding very quickly, but exotic plants such as castor bean have made serious inroads into the streambed here, and unless they are quickly removed, and continuously managed for, the value of the canyon to wildlife will inevitably decline. Fencing might also help in this, since even though the canyon is rarely-visited by park users,

there is full access to the creek, leaving it vulnerable to trampling and additional weed invasion.

6.1.3.6 Crystal Springs

Years ago when the picnic areas of Griffith Park were being installed, the streams through Mineral Wells and Crystal Springs (incl. lower Fern Canyon) were replaced by shallow cement and bare dirt culverts (Fig. 3) which now convey water quickly through the lawn and to drain into the Los Angeles River. Given the importance of bio-available water and wetland habitat in today's Los Angeles, this presents a good opportunity to restore these streams - even small stretches of the culverts - back into native riparian habitat. Instead of looking at cement and algae, park visitors could catch tadpoles and watch dragonflies dart over reed-filled pools.

Fig. 3. Dirt culvert in Crystal Springs area (drains to Los Angeles River) which could be restored to a more natural state. Photographed Dec. 2007 by Daniel S. Cooper.

6.1.3.7 Oak Canyon

Like Spring Canyon, the streambed along Oak Canyon was lined with cement years ago, and therefore any water entering the system doesn't soak into the soil and irrigate the plants. Though seasonal, Oak Canyon has several springs feeding into it via side canyons, and the removal of this cement, in addition to control of non-native plants, would greatly benefit wildlife along this important drainage.

6.1.3.8 Skyline Trail

A relict of misguided reforestation efforts, the northeastern corner of Griffith Park was heavily planted with eucalyptus tree in the early 1900s. Fortunately, the underlying vegetation - species-rich coastal sage scrub - was never cleared away, and still supports scrub-dependent species. Though removing all of the thousands of trees might be cost-prohibitive, key areas should be identified for aggressive restoration (including chipping all eucalyptus wood and using the chips for bio-fuel). The hills just west of the L.A. Zoo (vic. Skyline Trail) may support the best-quality sage scrub, so activity could begin there.

6.1.3.9 Toyon Canyon
For over 30 years, this 100-site was an active landfill that essentially filled-in an entire canyon in the center of the park. Though closed as a landfill in the 1980s, the various proposals for its re-use have not led to significant change, and it remains a big, weedy expanse in the middle of the park. Ecologically, it is the only area of extensive herbaceous (grassland) habitat in Griffith Park, and as such, is used by such open-country species as American kestrel and western meadowlark, birds with little habitat elsewhere in the urban Los Angeles area.

6.1.3.10 Los Angeles River
The Los Angeles River, though channelized along its banks, still retains a natural (mud) bed, and supports a community of riparian-dependent plants and animals not found elsewhere in the park, and quite rare in the Los Angeles Basin. The strips of sandy open land along the channel along Forest Lawn Dr. (incl. the "Headworks" site) still support native alluvial fan scrub which should be studied and preserved. Griffith Park has cooperated with several groups (including Friends of the Los Angeles River and Northeast Trees) which have been working to restore lands alongside the Los Angeles River for years.

6.2 *Facilitate the collection of wildlife distribution and ecological information*

The South Coast region of California is home to 158 special status vertebrate species (Bunn et al. 2006), and yet the status of Griffith Park wildlife prior to 2007, when formal investigations of wildlife presence here began, was virtually non-existent. From recent baseline studies (http://www.friendsofgriffithpark.org/GPNHS/Griffith.htm) we know that the park supports several sensitive species, including one mammal (San Diego desert woodrat), two reptiles (coastal whiptail, San Bernardino ringneck snake), and two birds (yellow warbler, ashy rufous-crowned sparrow) (Appendix II). In addition to these taxa, several other sensitive mammals, including several bats, amphibians (incl. Coast Range newt) and reptiles (coast horned lizard, California legless-lizard, two-striped garter-snake) are or were known from sites near the park (see Appendix II). These rare taxa may still be present in the park, possibly in very low numbers, but additional surveys are urgently needed to confirm this.

6.2.1 <u>Maintain a species inventory</u>
Establishing a standard methodology and training for carrying out wildlife resource inventories and surveys is critical to confirming the presence/absence of these in the park and for successful monitoring of wildlife in the park in future years. This cannot be a volunteer-led effort done by high school students or local residents, but must be coordinated by trained biologists. Examples of standardized survey protocols are available from the California State Parks' Inventory, Monitoring and Assessment Program website

(http://www.parks.ca.gov) and that of the Point Reyes Bird Observatory (www.prbo.org). Identification of additional sensitive species would not only allow for more informed management, it would also raise the profile of habitat protection efforts in the park and attract funding from regulatory agencies and conservation groups.

All natural history information should be centralized and made readily available to the public and maintained in a centralized location, both in hard-copy form and electronically (an "E-library"). This would allow park staff, that of other municipal departments, as well as interest groups and other citizens to gain access to the information. Such an "e-library" would include information on best management practices, relevant research studies/reports, species lists, and maps. A dedicated, funded effort should be made to collect any existing information scattered in different city departments and in various local research institutions to supplement ongoing efforts to catalogue and understand Griffith Park's wildlife resources.

6.2.2 Promote research in the park

Griffith Park should be available for appropriate biological and ecological research by academic institutions and other local organizations, and a mechanism - even if informal - of approving and overseeing this work should be established. Griffith Park's characteristics make it a unique site in which to investigate the ecology of natural communities in a habitat island. Park management should maintain a list of desired research topics that can be incorporated into research, and the park should archive copies of all reports resulting from research in the park to make available to the public (see Miller 2000). Electronic copies of this research may be maintained on the Griffith Park Natural History Website for public use (see 6.2.5 above).

6.3 *Minimize human-wildlife conflict*

Wildlife in Griffith Park represent significant part of the park's value to many visitors and local residents, as is the case in any urban environment (Savard et al. 2000). Longcore (2006) reports that house and property values can increase as much as threefold when they are proximate to permanent open space, and Thorsnes (2002) shows how scenic views, direct wildlife observation, and mere existence of wildlife are important factors in driving the increased property values. Longcore (*Ibid*) also details how other, non-measurable wildlife values benefit local residents. For many people knowledge of local wildlife existence provides psychological value, while direct observation of wildlife improves the aesthetic experience of spending time outdoors, particularly in urban areas (e.g., Gehrt 2004).

Wildlife also provide indirect social benefits as people communicate with each other about wildlife experiences either informally, or by joining organized wildlife interest groups like a local Audubon Society chapter (Butler et al. 2003, Longcore 2006). A study in the nearby Puente Hills by Martino et al. (2006) illuminates the value southern California residents place on wildlife in their open spaces, stating that wildlife was an important reason survey respondents chose to visit the park. Approximately 30% of people surveyed visited the park primarily to view or hear wildlife, and, perhaps more telling, over 60% disagreed that recreation should be a higher priority than wildlife conservation in park management. More than 80% of respondents enjoyed sharing the park with wildlife, and only 6% viewed wildlife as a nuisance (*Ibid*).

This section will examine ways that park staff and visitors and local residents living at the border of Griffith Park can help create a better environment for wildlife in the park, while minimizing their nuisance status inside and away from the park.

6.3.1 Strengthen law enforcement

Law enforcement in Griffith Park is currently shared by both the park rangers and the Los Angeles Police Dept. The Los Angeles Municipal Code list several provisions for the well-being of wildlife with respect to human recreation in Griffith Park (see Appendix I). Some laws are generally known by the public, if rarely followed, including those prohibiting smoking and requiring restraint of dogs by leash, proper disposal of dog defecation, etc. Other laws involve activities somewhat unique to Griffith Park that are little-known by most residents of Los Angeles, including restrictions on loitering and public nudity as well as on feeding of coyotes and other wild animals. Since so many violations take place away from roads and often along rugged trails, special training and equipment (e.g., mountain bikes) may be necessary for the law enforcement needed within the park.

6.3.1.1 Enforce Leash Law

Research should be undertaken to understand the impact of all recreation on Griffith Park's wildlife species, but particularly the impact of unrestrained dogs. A preliminary mammal survey suggests that certain sensitive mammal species may be avoiding areas of Griffith Park that are subject to high levels of dog-walking (Mathewson et al. 2007). The effect of dogs - particularly unleashed dogs - on wildlife is also well-documented (reviewed by Sime 1999, Lenth et al. 2006). Dogs disturb wildlife through barking, chasing, scent marking, and transmit disease through defecation, which is almost never removed by park visitors. Dogs may also reduce reproductive success for some wildlife (e.g., Yalden and Yalden 1990, Mainini et al. 1993, Miller et al. 2001). Of particular note to Griffith Park, Longcore (2006) cites a study by Abraham (n/d) from an urban park area in Berkeley, California, documenting dogs wandering off trails, causing avian flushes, startling nesting birds, and disrupting raptor behavior.

In accordance with city policy (and common sense), and out of concern for the park's wildlife, all companion animals should be restrained and recreation restricted to existing trails and facilities to encourage predictable behavior to which wildlife can adjust. Confining potentially detrimental activities (e.g., off-leash dog-walking) to designated areas of the park where they can be monitored, or introducing enforceable, temporal restrictions on activity around critical resources (e.g., seasonal closures) may be warranted (see Cole 1993, Knight & Temple 1995b). Undoubtedly, this would be possible only with sustained cooperation by the park's dog-walking community. Such cooperation is likely if the attitude toward wildlife preservation espoused by visitors to the nearby Puente Hills (Martino et al. 2006) is at all similar to that of Griffith Park's visitors, and if reasons for restrictions are clearly advertised.

6.3.1.2 Eliminate Vice Areas

Though largely unnoticed by the general public, several areas of "vice dens" and transient encampments have been established in canyons and other natural areas throughout the park, in which men engaged in daytime public sex/prostitution, drug use, and smoking. The outdoor activity peaks during the warmer months (Mar. - Nov.), and is apparently mainly limited to public restrooms during the winter. These vice dens have resulted in vegetation

trampling, unsavory litter that attracts non-native rats and other vermin, and even arson-caused fires originating from lit cigarettes and pipes. Though existing laws would allow for the elimination of these encampments, they are simply rarely enforced at Griffith Park, despite the fact that several recent fires - including the 800-acre May 2007 burn - have been caused by people smoking in the bushes.

Target areas for clean-up and enforcement where this vice situation is seriously impacting natural areas include Western Canyon/upper Ferndell and the slopes above the Mineral Wells picnic area, with additional activity at lower Brush Canyon (Fig. 4) and in lower Vermont Canyon (the latter the site of the 2007 fire).

Figure 4. Trampled coastal sage scrub, lower Brush Canyon. Green vegetation in foreground is non-native black mustard that has invaded following soil disturbance. Photographed Feb. 2008 by Daniel S. Cooper

Along with enforcement, information on why these laws exist should be made available through websites, on signs posted in picnic areas and at trailheads, and through brochures, with person-to-person contact such as a volunteer corps spreading key messages and modeling good behavior. Visitors are more likely to accept restrictions on their behavior as required by wildlife management goals if they understand the ecological reasoning behind the restrictions.

6.3.1.2 Eliminate Wildlife Feeding

Direct wildlife feeding at Griffith Park appears to mainly involve park visitors feeding coyotes from their cars, concentrated near a single parking lot in the Crystal Springs area at the base of Fern Canyon, where up to 8 coyotes per day are present more or less continuously (see Fig. 5).

Figure 5. Four coyotes (several more present off-camera) waiting for hand-outs, base of Fern Canyon. Photographed Dec. 2007 by Daniel S. Cooper. Photographed Nov. 2007 by Daniel S. Cooper.

Violations at chronic feeding areas (e.g., coyote feeding at parking lots at Crystal Springs), should be aggressively pursued, and law enforcement officials may have to make examples of repeat offenders for behavioral change to occur.

We also suggest several amendments to Los Angeles Municipal Code § 63.44 (Regulations Affecting Park and Recreation Areas) that would strengthen wildlife protection:

- An ordinance prohibiting the feeding of *all* wildlife and feral animals in Griffith Park would expand upon the existing LOS ANGELES, CAL., MUN. CODE, § 53.06.5.a (2007), prohibiting the feeding of non-domestic mammalian predators throughout Los Angeles.
- An ordinance restricting offtrail hiking would be a good companion to LOS ANGELES, CAL., MUN. CODE, § 63.44.B.2.a (2007), restricting park equestrian use to established trails.

- An ordinance prohibiting the release of any plant, animal, or other agent that would be harmful to the park's wildlife community should also be included in park regulation to reduce the impact of non-native species.
- An ordinance with language limiting light spillage from residential and commercial sources into wildlife habitat would strengthen LOS ANGELES, CAL., MUN. CODE, § 93.0017 (2007) and help to reduce deleterious edge effects.

6.3.3 Reduce "edge effects"

For many wildlife species taking refuge in Griffith Park, the hard border, or edge between the park open space and private yards and homes outside the park creates what are referred to as "edge effects". Though some species are attracted to this urban interface zone (see 4.3 above), taking advantage of both natural habitat and abundant anthropogenic food sources, others are adversely affected along urban margins. Detrimental edge effects include increased risk of predation - from both natural and domestic predators (particularly cats) - and habitat disturbance such as weed invasion and both noise and light pollution (Lepcyzk et al. 2003, Fernandez-Juricic et al. 2004, Radle 1998, Longcore and Rich 2004). In general, the greater the disturbance level surrounding a given habitat fragment, the more intense its edge effects are (McKinney 2002). This would suggest the existence of a band of edge effects extending in from the margins of Griffith Park, at least away from the less-developed western edge.

Knight & Temple (1995a) categorize wildlife response to human presence as attraction, avoidance, or habituation. Attraction is developed through positive experiences with humans, avoidance through negative interactions, and habituation through neither positive nor negative interaction, with wildlife simply becoming accustomed to human presence (Longcore 2006). Seymour (2005) examines these responses in detail, focusing on southern California, and outlines a number of actions that can be taken to discourage the negative effects of attraction. Property owners and land managers should seek to create a setting in which potential-nuisance wildlife species (incl. coyotes, skunks, etc.) develop a response somewhere between a habituated response and an avoidance response to human presence.

6.3.2.1 Landscaping and lighting
Every effort should be made to "soften" these edges to reduce the anthropogenic influences within the park, ideally through a combination of landscaping and human behavior. Property owners near the park can help mitigate these effects by planting native species around their home, and making sure outdoor lights are pointed downwards so there is no light spillage beyond property boundaries. To as great an extent as possible, outdoor lights should be turned on only when the outdoor area is being used, bulb wattages reduced, and height of lights reduced (Lockwood 2004). Landscapers should be encouraged to avoid planting invasive species such as lantana, fan palms, periwinkle (*Vinca major*), and others known to inhabit wild areas of Griffith Park.

Deer, rabbits and other herbivores may create problems by grazing of residential vegetation, which can be discouraged if necessary through *local* plantings of unpalatable species. Seymour (2005) provides an extensive list of unpalatable, graze-resistant, and repellent plant species that could line properties and discourage herbivores from entering (provided none is invasive!), which could be used locally where grazing is a chronic issue. Reducing the

amount of irrigated lawn adjacent to open space - or fencing these areas - may also reduce nuisance grazing issues (Landau and Stump 1994, Seymour 2005).

6.3.2.2 Pet management

Domestic pets are another major source of edge effects, as they elevate predation levels around the margins of any open space. They and their food dishes also attract predators (especially coyotes) and nuisance animals. Pets should be kept and, especially, fed, indoors if possible; if they are fed outside, the dishes and any leftover food should be promptly cleaned up after the feeding so potential predators or other wildlife are not attracted to the food. Dog and cat attacks have been shown to be a significant cause of urban reptile mortality (Shine and Koenig 2001), and cats are reported as prominent factor of bird population losses and small mammal mortality in residential areas (Gray 1999, Lepczyk et al. 2003, Calver et al. 2007). Furthermore, pets are a well-known source of disease readily transmitted to wildlife (e.g., Rosatte et al. 1991, Eymann et al. 2006). Although keeping pets indoors as much as possible is the most effective method for reducing predation and disease transmission, it remains an unpopular choice for pet owners (Calver et al. 2007). Some studies report reductions up to 50% in wildlife predation rate when cat's collars are fitted with bells or sonic warning devices (Ruxton et al. 2002, Nelson et al. 2005). Gray (1999) provides further tips on regulating pets and reducing cat predation such as sterilizing cats to prevent unintentional breeding and careful placement of bird boxes and bird feeders in areas cats are not active.

One of the more serious wildlife conflicts in residential areas is the predation of pets by coyotes. To avoid this, it is especially important to bring pets in at night, and dogs should be spayed or neutered to prevent ovulating female dogs from attracting male coyotes, or male dogs from being attracted to ovulating female coyotes and then being attacked by males in the coyote pack. It is further suggested that if no trees are present on a property, a cat post be erected to give pet cats an opportunity to escape in the event they are chased by a coyote (Seymour 2005). Residents' calls to shoot, poison or remove coyotes will not usually be taken seriously by wildlife officials - and neither should they; coyotes are common and adaptable, and the removal of one will only result in the replacement by another individual. Attraction reduction is clearly the best course of action when living with coyotes.

6.3.2.3 Building maintenance

Wildlife may also den or roost in or under structures on residential properties. Owners should inspect all structures and make sure any possible openings are protected against wildlife entrance. Chimneys should be capped and vents covered with a fine heavy mesh. Access to areas below decks or under houses should be denied by putting up a barrier like hardware cloth, being careful to bury it at least a foot underground to discourage animals from burrowing further (Seymour 2005). Seymour (*Ibid*) is also a good resource for information on more extreme measures to make residences unattractive to wildlife to be used as a last resort and only in consultation with an appropriate wildlife agency, including as wildlife repellents, adversive conditioning, and hazing.

6.3.3 <u>Manage recreation to avoid conflicts with wildlife</u>

It was Col. Griffith's intention that Griffith Park remain a place for human recreation; accordingly, all wildlife management plans must be based around balancing recreational

access with wildlife welfare. Griffith Park provides a unique opportunity for outdoor recreation within Los Angeles, and is thus an invaluable resource for local residents. However, un-managed human recreation has been detrimental to wildlife existence in parks, and here we highlight approaches to minimize this conflict. Though visitor usage of developed portions of the park, including picnic areas and points of interest, is well known, that within the park's interior, or adjacent to these developed areas, is more difficult to assess. Since most wildlife species live in the park's interior or depend on these habitats, we strongly suggest initiating a regular trail user count to quantify trail use and better identify human-wildlife conflict areas, which may change through the years.

The impact of human activity on wildlife is well documented and includes physiological stress and changes in habitat use, behavior and activity patterns (e.g., Whittaker and Knight 1998, Taylor and Knight 2003, George and Crooks 2006). Wildlife response to human disturbance varies by species; for example, HaySmith and Hunt (1995) report that migratory birds are more susceptible to human disturbance than resident species, and birds may change nesting behavior, even abandoning nests (Knight and Cole 1995a,b), and certain mammals have become more nocturnal to avoid human contact (Tigas et al. 2002). Animals expending energy avoiding human contact can result in altered energy budgets, leaving less energy for foraging and reproduction (Knight and Cole 1995a). This is particularly costly for adults with young; adults birds flushed from nests leave chicks vulnerable to heat stress and predators (Burger 1995).

The closure of unauthorized trails and enforced restrictions on creating new trails (including shortcuts) and off-trail travel should be a management priority to keep recreationists and their dogs on existing trails and to minimize soil erosion and habitat degredation. Miller and Hobbs (2000) report that additional trail construction increases weed invasion and leads to increased bird's nest predation, a phenomenon readily visible in areas with high levels of off-trail trampling (e.g., Western Canyon, Brush Canyon). Additionally, birds have been shown to be less prone to disturbance when recreationists stayed on designated trails (Fernandez-Juricic et al. 2004), and even habituated wildlife has been found to flush when exposed to unexpected stimuli like off-trail hiking (Geist 1978).

Finally, seasonal closures of certain trails or trail sections could also be explored, particularly during nesting season (April-May) when birds, amphibians, and other wildlife are reproducing and most vulnerable to disturbance.

6.3.4 Reduce "passive wildlife feeding"

Wildlife feeding is damaging on several fronts, depending on the type and location of feeding. Garbage left in the park attracts non-native species, particularly rats (*Rattus* spp.) and insects including Argentine ants that degrade the natural balance of native species and ecosystem function by driving out the unique native species that depend on the park (as opposed to the city) for their survival. Chronic garbage dumping, "cat colonies" and other types of concentrated feeding can result in un-naturally large numbers of native species (e.g., California ground-squirrel) as well, which can then become vectors for disease. Finally, native wildlife that becomes accustomed to anthropogenic feeding may begin to see humans as food sources, resulting in animals aggressively approaching people or damaging property in search of food (Conover 1999, Longcore 2006).

A local study looking at the effects of artificially high population densities resulting from supplemental feeding in the Santa Monica Mountains found the greatest coyote densities in areas of the most development, with anthropogenic food sources accounting for as much as 25% of coyotes' diets. Similar patterns have been reported for skunk and raccoon (Hoffman and Gottschang 1977, Riley et al. 1998), and Boydston (2005) reports smaller home ranges for some wildlife in urban parks than in rural open space due to abundant anthropogenic food sources.

Recent data collected by the Los Angeles Dept. of Animal Services reveals distinct patterns in the distribution of "nuisance animal" calls when plotted on a map (see http://www.friendsofgriffithpark.org/GPNHS/Griffith.htm): most of the calls for opossum, skunk, and raccoon - all urban-adapted mammals - have been in the urban areas and on the park's developed areas, whereas calls about deer and bobcat come from the immediate edge of the park's open space. Coyote calls are widespread in the urban interface zone around the park, but are largely confined to streets north of Sunset Blvd., indicating an intermediate level of tolerance to urbanization (G. Randall, City of Los Angeles, unpubl. data).

Artificially high densities of wildlife creates increased chances of disease transmission, particularly when animals gather at such high densities at feeding sites like trash cans (e.g., Brittingham 1991, Longcore 2006). Furthermore, anthropogenic food sources may negatively affect wildlife health and can impair natural foraging behavior (Grace 1976) and some wildlife may cease their natural roles in the ecosystem if they come to rely on human food sources (Knight & Temple 1995a, Orams 2002). Humans provide Griffith Park's wildlife with readily available food sources, and while much of this is unintentional (e.g., uncovered trashcans), direct wildlife feeding in and around the park does take place.

Dumpsters should not be stored adjacent to natural habitat where they can be accessed by wildlife that would otherwise not come into contact with garbage. The location and condition of dumpsters and garbage cans in the park should also be periodically reviewed; as of late Jan. 2008, 12 of the 34 dumpsters at a single site within Western Canyon had non-functioning lids, supporting a large ground-squirrel and (non-native) rat population here (D.S. Cooper, pers. obs.; Fig. 6).

Figure 6. Row of garbage bins along Western Canyon/upper Ferndell, adjacent to large block of mixed chaparral habitat. Photographed Dec. 2007 by Daniel S. Cooper.

Though some garbage cans in picnic areas in the park have enclosed tops, many are wide open, providing "easy pickings" for raccoons, ravens and crows, which in turn spread garbage throughout the park. Fallen fruit from trees should also be kept off yards, and trashcans and compost piles should be secured against animal foraging to further prevent wildlife from being attracted to residential properties. Fish in ornamental ponds should be provided artificial cover and sufficient water depth to discourage potential predators such as raccoons. Bird feeders that concentrate birds around limited aperatures or ledges should be avoided to reduce communicable disease, and those that attract squirrels, rats and other potential pests eliminated entirely (Seymour 2005).

Details of the regulations against providing food for wildlife, and the reasons for these regulations, should be visible to all park visitors but particularly at picnic areas. Visitors should be urged to properly dispose of all food waste to reducing foraging opportunities. All open trash cans currently in place at many Griffith Park picnic areas should be replaced with functional, animal-proof trash receptacles, and checked at regular intervals.

6.3.5 Restrict use of rodenticides in urban interface zone

A recent but potentially serious threat to wildlife that has been identified in the Los Angeles area has been the uptake of rodenticides containing blood anticoagulants by coyotes and other wildlife that feed on rats and mice. These have already been implicated in recent deaths

of the few remaining local mountain lions in the Los Angeles area (Leach 2005), and are probably having an undeteted effect on bobcat, gray fox, and other non-target species (Riley et al. 2007). Though Griffith Park has a well-established integrated pest management program which does not use anti-coagulant substances, pesticide usage by residents on the park's borders is not managed. The use of any poisons should be done only as a last resort by appropriate agencies (e.g., L.A. County Agricultural Commissioner) within specific areas, and must be strictly supervised. Alternate strategies should always be employed, such as proper storage of garbage and reduction of outdoor pet-feeding, which would be beneficial to wildlife as well as it would deter rodents. Obviously, public-education efforts targeted at residents in the urban interface zone would address this issue.

6.4 *Promote environmental education among park staff and park users*

Educating park staff and visitors about the region's natural ecology, and how human recreation in the park affects wildlife is one of the most important goals of this management plan. Informed visitors represent a tremendous resource for the protection of wildlife in Griffith Park. Indeed, the public must be viewed as a necessary ally in protecting wildlife, rather than a threat. Clearly, humans cause much degradation of the natural environment, yet this is largely out of ignorance; if properly educated about their consequences, most would probably modify their behavior.

For Griffith Park to provide quality information and opportunities for staff and the public to learn about Griffith Park's natural communities, existing environmental education programs that take place within the park should be periodically reviewed for their effectiveness and appropriateness. Educational and conservation partnership opportunities should be pursued with reputable local institutions such as the L.A. Zoo (located in the park itself), the National Audubon Society and with area universities. Contact information for experts on native wildlife should be maintained, and the park itself should be used as a classroom where possible. The park is a particularly valuable outdoor classroom resource for inner-city schools that do not have the resources to fund trips to distant wildernesses.

Though person-to-person communication has been proven most effective at conveying ecological information to park visitors and providing a life-long appreciation of nature (discussed by Ballantyne and Packer 2002), opportunities for passive education could also be explored, including weather- and vandal-resistant kiosks erected at popular trailheads (at a distance from parking lots and roads to ensure longevity) with information about Griffith Park's natural ecology and the effect of human recreation. Consistent signage identifying and explaining park regulations should be maintained at areas of frequent infraction. Informational brochures such as that recently produced by Cartifact, Inc. (2007) should be made available to the public throughout the park. Self-guided/nature trails must be reviewed for effectiveness (at other similar sites) before they are established.

Current knowledge and the educational needs of park personnel, particularly those whose actions directly and frequently affect wildlife habitat in the park including engineers, landscapers and maintenance workers, should be assessed. All park employees should be given basic environmental education so this knowledge can be applied everyday park management, landscaping and maintenance work. Other municipal employees working in

the park such as those from the Department of Water and Power, Los Angeles Zoo, and the Griffith Observatory should also be included in educational efforts.

6.4.1 Clarify threats from wildlife

Los Angeles residents have a love-hate relationship with wildlife. They marvel at seeing red-tailed hawks soaring over the hills, yet clutch their pets close at the sight of that same hawk near their backyard. It is critical for park staff to understand and provide information and perspective on the risk of *actual* interactions with wildlife that park visitors and area residents are likely to encounter during a visit, rather than to scare people away from venturing outdoors. Hiking trails throughout the region (i.e., not just in Griffith Park) have warning signs announcing the presence and threat of mountain lions, rattlesnakes, and even poison-oak; yet unintentional/unprovoked encounters with dangerous wildlife are extremely rare, and incidents requiring medical attention - particularly in comparison with those involving dog bites, bicycling accidents, and more mudane accidents - are exceedingly few. Park visitors are far more likely to be injured or even killed *driving to* Griffith Park than hiking there. Despite a near-constant barage of mountain lion, black bear and even coyote warnings on the local news media, no wildlife species in Griffith Park is likely to pose a direct threat to humans, including coyote, rattlesnake, tarantula, scorpions, and hawks.

6.4.1.1 Mammals

Most conflicts with mammals arise from their denning in (or under) human structures, or foraging in garbage cans or gardens where they are not welcome. In the Griffith Park area, raccoons may be the most problematic scavengers, as they are able to break into sealed garbage containers and tend to wash their food (esp. garbage) in backyard fountains and pools.

Dogs are by far the most dangerous animal in Griffith Park; they (especially family pets, which account for the majority of dog bites) bite an estimated 4.5 million people in the United States every year, with 800,000 requiring medical attention and between 15-20 resulting in death each year (Weiss et al. 1998). In California, over 800 people are hospitalized from dog bites annually (Feldman et al. 2004), and Los Angeles County alone estimates 20,000-25,000 bites each year (Los Angeles County Veterinary Public Health n/d).

Documented coyote attacks on people - as opposed to coyotes attacking pets, or people tormenting coyotes which then may snap menacingly at humans - are, similarly, virtually unknown, though an unattended toddler was apparently bitten in the park near a known coyote feeding area in the park in 1992 (A. Torres, via email). Coyotes are very common residents of the Santa Monica Mountains and may be seen daily in Griffith Park and the surrounding neighborhoods of the urban interface zone, scarcely noticed by joggers, hikers, and other visitors to the park. However, local coyotes do kill smaller pets (cats and small dogs) in residential areas (as may bobcat to a much lesser degree; Seymour 2005), making them unpopular with some residents. Our only wild mammal capable of killing a human adult, the mountain lion, is at best a rare visitor to the park, with occasional sightings (none verified) over the years (A. Torres, City of Los Angeles Dept. of Recreation and Parks, pers. comm.). Reported lion attacks in southern California may have increased somewhat, but

they are still virtually unknown in the Los Angeles area, despite the millions of people recreating in the outdoors here each year.

As for disease, all mammals — particularly bats, raccoons, foxes, skunk, and coyote — are potential hosts to the rabies virus, which then could be transmitted to humans; however, transmission of rabies from wild animals is extremely rare. From 1990-2006, just 40 humans were infected by rabies in the United States, four of whom were infected after receiving an organ transplant from an infected donor (Blanton et al. 2007). Since 1997, there have been just 6 reported cases of rabies in humans in California, at least three of which originated in foreign countries (California Department of Health Services n/d, Blanton et al. 2007). Additionally, each of the 90 reported rabies cases *in wildlife* in Los Angeles County since 1997 has involved bats; one must go back to 1979 to find a confirmed rabies case in another wildlife species, a skunk, in the county (see: http://lapublichealth.org). Mammals are also hosts for several other zoonoses, or diseases that could be transmitted to humans. Common sense such as appreciating wildlife from a distance, not handling sick or dead mammals, and avoiding contact with wildlife urine and feces sufficiently decreases chances of disease transmission to the point where it should be of minimal concern.

6.4.1.2 Reptiles

Statistics on snakebites are imprecise, but it is estimated that between 7000-8000 people are bitten by venomous snakes annually in the United States, with five or six resulting in death (Gold et al. 2002). The California Poison Control System receives 250 rattlesnake bite cases each year, with over 50 reports from southern California (County of Los Angeles Public Health 2006). Griffith Park is home to one venomous snake, the Southern Pacific rattlesnake, but with appropriate awareness and common sense, the chances of being bitten are quite slim. The majority of snakebites are caused by intentional handling of snakes, and alcohol intoxication is a factor in many bites (Wingert and Chan 1988). Visitors to Griffith Park should avoid handling all snakes (and wildlife in general). Futhermore, visitors should never place their hands into cavities or under objects, increased vigilance should be exercised around rocky areas and other likely sunning sites, and off-trail hiking where ground visibility is impaired should be avoided.

6.4.1.3 Insects/invertebrates

Insects, particularly bees and wasps, may actually pose the greatest threat from wildlife to park visitors, as they are especially attracted to picnic areas, garbage cans, and landscaping. Ticks, fleas and mosquitoes also transmit disease from wildlife reservoirs to humans through bites. Wearing light-colored clothing, long sleeves and pants when weather permits, and using insect repellent on exposed skin when outdoors will substantially reduce one's chance of being bitten. Avoiding off-trail hiking also reduces the chance of being bitten by ticks. Venomous spiders (e.g. tarantulas) and scorpions are scarce in the park, and are unlikely to be encountered by park visitors not specifically looking for them.

6.4.1.4 Birds

Despite recent scares over bird flu and other diseases, birds in Griffith Park pose little threat to human welfare, although a number of species are viewed a nuisance species for leaving

droppings (always on cars), scavenging in and spreading garbage, or roosting in residential structures. The most frequent culprits locally include rock pigeons, American crow and common raven, European starling, house finch, and house sparrow (Seymour 2005, pers. obs.). Crows, like raccoons, often wash their prey before eating, which fouls backyard fountains and pools. Many of these "problem" birds are non-native, or have had their populations hugely augmented by tree-planting, pet-feeding, and other anthropogenic practices. Formal bird surveys initiated in 2007 revealed that most of these urban-adapted species are still scarce throughout the park away from the immediate edge.

6.4.2 Develop volunteer opportunities

Citizen participation in planning and implementing habitat enhancement and wildlife protection measures is another great method for environmental education. Communication between citizens and Griffith Park management is vitally important to understanding concerns potential park visitors have about human-wildlife interaction and implementing measures to meet both park user and wildlife needs. Involvement in the planning process gives community members a better idea of why management actions are taken and increases the overall likelihood of a plan's success.

Volunteers should be enlisted when possible to assist in habitat enhancement and protection efforts. Many potential volunteer groups have members with some degree of expertise in various areas of Griffith Park ecology that can be shared with fellow volunteers and park staff. Numerous projects involving minimal specialized training can be undertaken employing volunteers including trail maintenance, assisting in species surveys, exotic plant removal and management, native species planting, and organizing and carrying out educational events. Volunteer action days and work parties in Griffith Park will also help to foster a sense of community stewardship for the park and wildlife resources living in the park.

7 WILDFIRE

Wildfire management actions in Griffith Park can have major impacts on wildlife and wildlife habitat, and in this section we present current knowledge of wildfire in southern California as it pertains the park. It should be stressed that we only present only a brief, simplified overview of fire in the region, and that scientific understanding of wildfire and fire management is continually evolving. Park managers should make an effort to stay abreast of the most current research on wildland fire, particularly along the urban-wildland interface.

7.1 *Wildfire in the southern California ecosystem*

Wildfires are a natural part of the southern California ecosystem. Fires occurred before human habitation of the area, and they will continue to be a feature of the landscape. However, there seems to exist a gap between public perception of wildfire in the area and the scientific understanding of current fire regimes (Keeley et al. 2004). The prevailing thought among the general population is that years of fire suppression management in the southern California has led to unusually severe wildfires because of unnatural fuel buildup.

This perception applies to many forests in western states, but chaparral and scrub habitats are quite different.

The nature and history of fire in a chaparral ecosystem is much different than fires in a coniferous forest (Keeley and Fotheringham 2006). In southwestern coniferous forests, natural fires are typically low-intensity, spread by patchily-distributed surface fuels (known as "brush") below the forest canopy. High-intensity "crown fires" (those that reach the tree-tops) occur only on a limited scale in these forests. In many forests, fire suppression in has been successful to the point of exclusion, throughout the American West. This has led to unnatural fuel conditions in the understory of forest that has set the stage for severe fires in these areas (*Ibid*).

Chaparral fires are typically large, high-intensity, "crown" fires (burning entire shrubs and small trees, rather than only the understory), and fire suppression efforts have *not* been successful in excluding fire from this landscape (*Ibid*). On the contrary, fire frequency and total land area burned in the region has been continually increasing in the past century, in conjunction with the increasing human population. Nearly all ignitions, 98% by one estimate, are due to human-related activity, with arson and arcing powerlines being the major culprits in southern California (Keeley et al. 2004). Thus, it is clear the current fire regime is not a product of fire management, and that there is no need to introduce additional fire to the ecosystem, such as "controlled burns" to restore it (*Ibid*, Keeley and Fotheringham 2001).

Another popular misconception - also informed by forest management, as opposed to scrubland management - is that a rotational schedule of prescribed burning to create a landscape mosaic of different age stands will prevent severe fires. The thinking behind this originates in the observation that fores fires will self-extinguish in stands of younger vegetation, as they do in open areas within forested landscapes (Keeley and Fotheringham 2001). Again, current research on chaparral disputes this, and shows that vegetation age and distribution is only a minor factor determining the severity of chaparral fires.

A final misguided belief is that high fire frequency in southern California is "natural", since chaparral shrublands are characterized as “fire-adapted” ecosystems. That characterization is misleading, since it is not fire itself that shrubland species are adapted to, but the other way around; the vegetation community of a region reflects its past fire frequency (Keeley and Fotheringham 2006). Therefore, extensive tracts of chaparral that have been growing untouched by fire for decades (or even centuries) support a unique array of associated lichens, invertebrates, and wildlife, all of which is vulnerable to wildfire. Any increase in fire frequency in these established scrub communities do not leave enough time for native plants to recover, and allow for the invasion of aggressive exotic species (Keeley 2002).

Southwestern California has the most dangerous fire climate in the country, with extremely dry summers followed by late fall winds off the Mojave Desert (known as "Santa Anas") creating severe fire conditions every year, often extending through the winter in dry years. These winds push fires though vegetation of any age, and thus rotational prescribed burning cannot stop these often large fires (Keeley and Fotheringham 2006). This is not to say that prescribed burning has *no* place in California shrubland fire management: under moderate moisture and wind conditions fires will burn out or may be contained by firefighters (Keeley and Fotheringham 2001). However, severe conditions are not rare, and should be anticipated

by land managers, particularly as more people come into contact with wildland along roads and trails.

7.2 *History of fires in Griffith Park*

Griffith Park has been largely spared by the nearly annual fires that have hit National Forest and other public lands elsewhere in the region, and has only seen three major (>10 acres) wildfires in the past century. An October 3, 1933 fire broke out in the Mineral Wells area, burning 47 acres and killing 29 people, making it the deadliest wildfire in the city's history. A May 12, 1961 fire consumed 814 acres in the southern part of the park, and a May 8, 2007 fire burned 817 acres in the southeastern quadrant.

7.3 *Wildfires and Wildlife*

Griffith Park still supports large areas of dense, old, unburned scrub, particularly on the northern slopes of Mt. Lee, on high ridges in the center of the park, and on slopes of Brush Canyon. Currently large populations of chaparral-dependent wildlife (e.g., western whiptail, California thrasher) and surviving remnant populations of fire-sensitive plants, notably old individual chamise, scrub oak, and manzanita plants (D. Cooper and R. Fisher, unpubl. data) are a testiment to the resiliance of the vegetation community here. However, the park is still surrounded by a massive urban landscape which is totally dominated by non-native, often invasive plant species. Thus, park managers should make sure fire frequencies in the park do not exceed historical level for the region, and should control species non-native invasions where possible to ensure ecologically functional habitats.

7.3.1 Wildlife response to fire

Most existing scientific knowledge about wildlife response to fire indicates that responses are quite species-specific. It should be noted that many studies are from prescribed burns, which typically do not burn at the same intensity as a wildfire. However, these studies to provide insight into how Griffith Park's wildlife likely react to fire.

7.3.1.1 Herptiles

Direct mortality from wildfire is thought to be of minor concern for many herptiles. Reptiles and terrestrial stages of amphibians are likely able to seek refuge underground or under protective refugia (Russell et al. 1999, Pilliod et al. 2003). Bury (2004) suggests that since most wildfires occur in the hottest, driest times of the year, terrestrial amphibians are buried deep underground for the season and are not subject to mortality during fires. Fires during the wet season may result in increased mortality; however no data exist to confirm this (Bury 2004). Aquatic amphibians are more sensitive to the abrupt environmental changes that accompany wildfire. The fire itself may heat water to temperatures above which amphibians (and their eggs and larvae) cannot survive (Pilliod et al 2003). In the aftermath of fires, streams see increased sedimentation, increased solar warming due to reduced forest canopy overhead, and increased exposure to ultraviolet-B rays, creating conditions unfavorable for aquatic amphibians (*Ibid*).

A study in a central California oak forest detected no changes in reptile or amphibian abundance after a prescribed fire based on monitoring two years prior to and two years

subsequent to the fire (Vreeland and Tietje 2002); in fact many reptile species respond favorably to the open, hot, xeric conditions created by fires (Bury 2004). Studies of terrestrial amphibian richness and abundance in areas of a Pacific Northwest forest affected by wildfires indicate that there is no difference when compared with unburned forests (Bury 2004). However, Lyon et al. (2000*a*) also notes that amphibian populations in forest habitat are related to woody debris on the ground, which is reduced in fires and which takes some time to accumulate in post-fire years.

7.3.1.2 Mammals

As with herptiles, fires are thought to kill or injure a relatively small proportion of mammal populations in a given region. Mammals' ability to survive an event depends in large part on the mobility of individual species and the characteristics of the fire itself (Lyon et al. 2000*a*). Small mammals generally escape fire by using underground tunnels or taking refuge in root holes or under rocks and large dead woody matter (Ford et al. 1999). Species that construct nests at the surface, such as rabbits and woodrats, are most susceptible to fire mortality; however, though mortality may be high for these species, their natural fecundity enables their populations to rebound quickly in future years (Lyon 2000*a*). Literature suggests that direct mortality of large mammals (such as deer) is quite small, as these species are able to move out of harm's way, but mortality is increased in fast-moving fires with thick groundsmoke (Lyon 2000*a*). Large mammals in Griffith Park may be restricted in their movement during a fire due to the barrier formed by adjacent residential areas, roadways, and other obstructions inhibiting their escape out of the burn area. Thus, residents immediately adjacent to the park should be made aware of a potential temporary influx of wildlife into their backyards during in the event of a fire (as most surely are). Furthermore, biological movement corridors out of and into the burn area should be identified and left as unobstructed and undisturbed as possible during a fire to allow for successful escape.

After a fire moves through, mammal usage of burned areas depends on the local amount of habitat and food resources remaining, and many return within days of the fire burning out (Lyon et al. 2000*a*). For many fires there is sufficient habitat left for small mammals within the burn zone, particularly on steep slopes and in singed (but still alive) groves of trees. A study of wildlife response to severe fires in the Santa Monica Mountains found that lightly-burned refuges at canyon bottoms allowed rodents to recolonize the area within 6 months of intense fires (Schwilk and Keeley 1998). Schwilk & Keeley (1998) also noted a positive relationship between deer mouse abundance and distance from unburned edges. Seed visibility increases after a fire, and the postfire sprouting of forbs and other herbaceous vegetation attracts small mammals back to burned areas, despite their being more conspicuous to predators (Lyon et al. 2000*a*). Large herbivores return once sufficient vegetation for bedding and foraging has been restored (often with a single year), and some species may spend the intervening time around the edges of the burn (*Ibid*). Mammalian carnivores will venture into burned areas soon after a fire to hunt for small vertebrate prey, but are unlikely to completely recolonize the area until sufficient cover has been restored.

In the month after the 2007 fire in Griffith Park, mule deer and coyote were sighted on multiple occasions deep into the burned area of the park browsing on remaining vegetation (pers. obs.), and fresh diggings by Botta's pocket-gopher were obvious over large areas of the burn.

7.3.1.2 Birds

Direct avian mortality in wildfires is largely dependent upon the timing of the fire; immediate mortality is probably quite low since most wildfires occur in the late summer and autumn, after nesting has completed, when adult birds can readily take flight to escape the fire. However, once the fire removes the vegetation, certain bird species originally present cannot return, and must try to survive in adjacent habitat (with unknown results in the case of the Griffith Park fire). Fires during the nesting season have a higher mortality due to nestlings and fledglings that are unable to escape (Lyon et al. 2000*b*). As with all wildlife species, the habitat changes after a fire that have a greater impact on avian populations than direct mortality. Many songbirds and ground-dwelling birds will leave a burned area until resources for foraging and reproduction have been reestablished (Lyon et al. 2000*a*). Stanton (1986) found that burned coastal sage scrub offered only seasonal foraging opportunities for avian species in contrast to an unburned control site, which provided more habitat requirements in the first two years after a fire. Furthermore it was noted that many species documented in the burned area were nonresident species taking advantage of seasonal resources; resident breeding populations overwhelmingly preferred the unburned control site.

Some bird species are actually attracted to burned areas, particularly raptors and scavengers, because of the increased prey abundance and visibility (Lyon et al. 2000*a*). Existing studies indicate that aerial, ground, and bark insectivores are also attracted burned areas (Saab and Powell 2005). In coastal sage scrub, studies have reported woodpeckers and flycatchers being attracted to burned areas in response to increased access to food resources (Moriarty et al. 1985, as cited in Lyon et al. 2000*a*, Stanton 1986). These findings have been seen in preliminary surveys of avian useage in Griffith Park, with bark-gleaning arboreal species persisting locally high in canyons where trees remained (e.g., Fern Canyon), even if the foliage was mostly burned off, and aerial foragers (incl. flocks of swifts and swallows) feeding above the burned area (D. Cooper, unpubl. data)

7.3.2 Habitat regeneration

Wildlife response to fire in Griffith Park is largely dictated by the novel habitat created by the fire. Griffith Park contains outstanding examples of scrub and woodland habitat that continues to be lost in southern California, both from development and through an increased fire regime (see Section 7.1). Therefore, the urge to re-vegetate the park through planting and/or seeding is an understandable reaction. Postfire seeding has been the subject of much attention, particularly in California, where it has been used for decades (often with non-native seed with ecologically disasterous results). However, there is little scientific support for its use; an examination of existing studies illuminate its ineffectiveness, particularly in California where rains often arrive as intense storms, washing seeds away before they can germinate, or where long dry periods will follow rains, killing grass seedlings (Keeley et al. 2006).

A Santa Monica Mountains study comparing postfire plant recovery at a site managed passively, relying only on natural regeneration, and a site actively managed with seeding found no significant differences in plant cover (Keeley 1996). Not only is seeding not effective in producing cover, it also contributes to invasion by exotic species, reduces native

biodiversity, and creates areas of dense, fine fuels prone to future fires (Keeley et al. 2006). Recent efforts to use native seed stock for postfire seeding may seem encouraging, but local stocks required for genetic compatability are often unavailable or of insufficient volume (*Ibid*).

Of course, this reluctance to re-seed following a burn is not to ignore the need for slope stabilization in localized areas to ensure public safety and protection of property (even at the risk of seed washing away, or future fire danger from an abundance of dry grasses), as certain areas require active management throughout the year. From a wildlife management perspective, however, these activities should be as limited in extent as possible, and have the smallest chance of introducing exotic vegetation. In review of slope stabilization technique efficacy, the U.S. Forest Service found that seeding was often the least effective method; other methods, such as mulching and the use of physical barriers, were deemed more effective, and carry less risk of disrupting natural plant regeneration (Robichaud et al. 2000).

7.3.3 Monitoring Griffith Park wildlife postfire response

The May 2007 fire provided an excellent opportunity to study wildlife response to fire in Griffith Park. The park is rather unique in its degree of isolation, and studies could provide the scientific community with valuable information on wildlife response to fire in in isolated reserve (which many habitats in the region are quickly beoming). Though we do not have much baseline data from prior to the fire, continued wildlife surveys in both burned and unburned areas will provide much-needed information on wildlife response to wildfire, and will give us insight into habitat needs for future management.

8. LITERATURE CITED

Agosta, S. J. 2002. Habitat use, diet and roost selection by the Big Brown Bat (*Eptesicus fuscus*) in North America: a case for conserving an abundant species. Mammal Review 32: 179-198.

Allen, A.P., and R.J. O'Connor. 2000. Interactive effects of land use and other factors on regional bird distributions. Journal of Biogeography 27: 889-900.

Allen, E. B., S. A. Eliason, V. J. Marquez, G. P. Schultz, N. K. Storms, C. D. Stylinski, T. A. Zink, and M. F. Allen. 2000. "What are the limits to restoration of coastal sage scrub in Southern California?" *in* J. E. Keeley, M. Baer-Keeley, and C. J. Fotheringham, eds. 2nd Interface between ecology and land development in California. U.S. Geological Survey open-file report 00-62. Sacramento, CA. Pp 253-262

Bayrakçi, R., A.B.Carey, and T.M. Wilson. 2001. Current status of the Western gray squirrel population in the Puget Trough, Washington. Northwest Science 75: 333-341.

Blair, R.B. 2001. Birds and butterflies along urban gradients in two ecoregions of the U.S. *In* Lockwood, J.L. and M.L. McKinney (eds.), Biotic Homogenization. Norwell (MA): Kluwer. Pp: 33–56.

Blanton, J.D., C.A. Hanlon, and C.E. Rupprecht. 2007. Rabies surveillance in the United States during 2006. Journal of the American Veterinary Medical Association 231: 540-556.

Bolger, D.T., A.V. Suarez, K.R. Crooks, S.A. Morrison, and T.J. Case. 2000. Arthropods in urban habitat fragments in southern California: area, age, and edge effects. Ecological Applications 10: 1230-1248.

Bowler, P.A. 2000. Ecological restoration of coastal sage scrub and its potential role in habitat conservation plans. Environmental Management 26: S85-S96.

Boydston, E.E. 2005. Behavior, ecology, and detection surveys of mammalian carnivores in the Presidio. Final Report. U.S. Geological Survey, Sacramento, CA.

Brittingham, M.C., 1991, "Effects of winter bird feeding on wild birds" *in* L.W. Adams and D.L. Leedy (eds.), Wildlife Conservation in Metropolitan Environments: Proceedings of a National Symposium of Urban Wildlife, Columbia, MD, National Institute for Urban Wildlife.

Broadfoot, J.D, R.C. Rosatte, and D.T. O'Leary. 2001. Raccoon and skunk population models for urban disease control planning in Ontario, Canada. Ecological Applications 11: 295-303.

Bruyea, G.P. 2003. Preliminary insect (butterfly) survey at Griffith Park, Los Angeles, California. Report to Keane Biological Consulting, Long Beach, CA. October 30, 2003.

Bunn, D., A. Mummert, R. Anderson, K. Gilardi, M. Moshovsky, S. Shanks, and K. Stahle. 2006. California Wildlife: Conservation Challenges. Prepared by Wildlife Health Center, University of California, Davis for California. Submitted to U.S. Fish & Wildlife Service, 14 September, 2006, 602 pp.

Burger, J., 1995, "Beach recreation and nesting birds", *in* R.L. Knight and K.J. Gutzwiller (eds.), Wildlife and Recreationists: Coexistence Through Management and Research, Washington D.C., Island Press, pp. 281–295.

Bury, R.B. 2004. Wildfire, fuel reduction, and herpetofaunas across diverse landscape mosaics in northwestern forests. Conservation Biology 18: 968-975.

Butler, J.S., J. Shanahan, and D.J. Decker. 2003. Public attitudes towards wildlife are changing: A trend analysis of New York residents. Wildlife Society Bulletin 31: 1027–1036.

California Academy of Sciences (undated). Ants: Hidden worlds revealed. Available online at http://research.calacademy.org/exhibits/ants/#harvester. Retrieved January 2008.

California Department of Health Services (undated). Reported animal rabies by county and species. California, accumulative 1997-2006. Available online at http://www.dhs.ca.gov/dcdc/disb/pdf/1997-2006%20ACCUMULATIVE%20RABIES%20BY%20COUNTY.pdf. Retrieved January 2008.

California Partners in Flight. 2002. Version 2.0. The oak woodland bird conservation plan: a strategy for protecting and managing oak woodland habitats and associated birds in California (S. Zack, lead author). Point Reyes Bird Observatory, Stinson Beach, CA. Available online at http://www.prbo.org/calpif/plans.html. Retrieved Jan. 2008.

California Partners in Flight. 2004. Version 2.0. The Coastal Scrub and Chaparral Bird Conservation Plan: a Strategy for Protecting and Managing Coastal Scrub and Chaparral Habitats and Associated Birds in California (J. Lovio, lead author). PRBO Conservation Science, Stinson Beach, CA. Available online at http://www.prbo.org/calpif/plans.html. Retrieved Jan. 2008.

Calver, M., S. Thomas, S. Bradley, and H. McCutcheon. 2007. Reducing the rate of predation on wildlife by pet cats: The efficacy and practicability of collar-mounted pounce protectors. Biological Conservation 137: 341-348.

Cartifact, Inc. 2007. Griffith Park (map). Published by Tom LaBonge, Concilmember, City of Los Angeles, 4th District, in association with Jon Kirk Mukri, General Manager, City of Los Angeles, Dept. of Recreation and Parks. September 2007.

Carney, S.E., M.B. Byerley, and D.A. Holway. 2003. Invasive Argentine ants (*Linepithema humile*) do not replace native ants as seed dispersers of *Dedromecon rigida* (Paveraceae) in California, USA. Oecologia 135: 576-582.

Christian, C.E. 2001. Consequences of a biological invasion reveal the importance of mutualism for plant communities. Nature 413: 635-639.

Cole, D.N., 1993, "Minimizing conflict between recreation and nature conservation", *in* D.S. Smith and P.C. Hellmund (eds.), Ecology of Greenways: Design and Function of Linear Conservation Areas, Minneapolis, MN, University of Minnesota Press, pp. 105–122.

Conover, M. 1999. Can waterfowl be taught to avoid food handouts through conditioned food aversions? Wildlife Society Bulletin 27: 160–166.

Conover, M., 2002, Resolving Human–Wildlife Conflicts: The Science of Wildlife Damage Management, Boca Raton, Fl., Lewis Publishers.

Cooper, D.S. 2000. Breeding landbirds of a highly-threatened open space: The Puente-Chino Hills, California. Western Birds 31:213-234.

Cooper, D.S. 2002. Geographical associations of breeding bird distribution in an urban open space. Biological Conservation 104: 205-210.

County of Los Angeles Public Health. 2006. Care for rattlesnake bites. The Public's Health 6: 1-6.

CNDDB. n/d. California Department of Fish and Game's California Natural Diversity Database (online). http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp. Retrieved January 2008.

Crooks, K.R. 2002. Relative sensitivities of mammalian carnivores to habitat fragmentation. Conservation Biology 16: 488–502.

Crooks, K.R., A.V. Suarez, D.T. Boger and M.E. Soule. Extinction and colonization of birds on habitat islands. Conservation Biology 15: 159-172.

Crooks, K.R. & Soulé, M.E. 1999. Mesopredator release and avifaunal extinctions in a fragmented system. Nature, 400: 563–566.

DeLisle, H., G. Canton, J. Feldner, P. O'Connor, M. Peterson and P. Brown. 1986. The Distribution and Present Status of the Herpetofauna of the Santa Monica Mountains of Los Angeles and Ventura Counties, California. Special publication No. 2 of the Southwestern Herpetoligist Society, December 1986.

Denys C. and H. Schmidt. 1998. Insect communities on experimental mugwort plots along an urban gradient. Oecologia 113: 269–277.

Dickman C.R. 1987. Habitat fragmentation and vertebrate species richness in an urban environment. Journal of Applied Ecology 24: 337–351.

Eberts, M. 1996. Griffith Park. A Centennial History. The Historical Society of Southern California. Pp 448.

Elmhagen, B. and S. Rushton. 2007. Trophic control of mesopredators in terrestrial ecosystems: top-down or bottom-up? Ecology Letters 10: 197.

Eymann, J., C.A. Herbert, D.W. Cooper, and J.P. Dubey. 2006. Serologic survey for *Toxoplasma gondii* and *Neospora caninum* in the common brushtail possum (*Trichosurus vulpecula*) from urban Sydney, Australia. Journal of Parasitology 92: 267-272.

Fedriani, J, T. Fuller; R. Sauvajot, and E. York. 2000. Competition and intraguild predation among three sympatric carnivores. Oecologia 125: 258–270.

Feldman, K.A., R. Trent, and M.T. Jay. 2004. Epidemiology of hospitalizations resulting from dog bites in California, 1991-1998. American Journal of Public Health 94: 1940-1941.

Fernández-Juricic, E., R. Vaca, and N. Schroeder. 2004. Spatial and temporal responses of forest birds to human approaches in a protected area and implications for two management strategies. Biological Conservation 117: 407–416.

Fisher, R, A. Suarez, and T. Case. 2002. Spatial patterns in the abundance of the coastal horned lizard. Conservation Biology 16: 205–215.

Ford, W.M., M.A. Menzel, D.W. McGill, J. Laerm, and T.S. McCay. 1999. Effects of a community restoration fire on small mammals and herpetofauna in the southern Appalachians. Forest Ecology and Management 114: 233-243.

Gehrt, S.D. 2004, "Ecology and management of striped skunks, raccoons and coyotes in urban landscapes", *in* N. Fascione, A. Delach and M.E. Smith (eds.), People and Predators: From Conflict to Coexistence, Washington D.C., Island Press.

Geist, V. 1978, "Behavior", *in* J.L. Schmidt and D.L. Gilbert (eds.), Big Game of North America, Ecology and Management. Harrisburg, PA. Stackpole Books. pp. 283–296.

George, S.L. and K.R. Crooks. 2006. Recreation and large mammal activity in an urban nature reserve. Biological Conservation 133: 107-117.

Gold, B.S. R.C. Dart, and R.A. Barish. 2002. Bites of venomous snakes. New England Journal of Medicine 347: 347-356.

Grace, E.S., 1976. Interactions between men and wolves at an Arctic outpost on Ellesmere Island. Canadian Field Naturalist 90: 149–156.

Gray, F. 1999. Reducing cat predation on wildlife. Outdoor California. May-June 1999: 5-8.

Haas, C.D., A.R. Backlin, C.J. Rochester, and R.N. Fisher. 2002. Monitoring reptiles and amphibians at long-term biodiversity monitoring stations: the Puente-Chino Hills. United States Geological Survey Final Report. 43 pp.

HaySmith, L. and J.D. Hunt, 1995, Nature tourism: Impacts and management", in R.L. Knight and K.J. Gutzwiller (eds.), Wildlife and Recreationists: Coexistence Through Management and Research, Washington D.C., Island Press, pp. 203–219.

Hoffman, C.O. and J.L. Gottschang. 1977. Numbers, distribution, and movements of a raccoon population in a suburban residential community. Journal of Mammalogy, 58: 623–636.

Keeley, J.E. 1996. Postfire vegetation recovery in the Santa Monica Mountains under two alternative management programs. Bulletin of the Southern California Academy of Sciences 95: 103-119.

Keeley, J.E. 2002. Fire management of California shrubland landscapes. Environmental Management 29: 395-408.

Keeley, J.E., M.S. Witter, and R.S. Taylor. 2004. Challenges of managing fires along an urban-wildland interface – lessons from the Santa Monica Mountains, Los Angeles, California. In the Third International Wildland Fire Conference, Sydney, Australia. 9

pp.

Keeley, J.E. and C.J. Fotheringham. 2001. Historic fire regime in southern California shrublands. Conservation Biology 15: 1536-1548.

Keeley, J.E. and C.J. Fotheringham. 2006. Wildfire management on a human-dominated landscape: California chaparral wildfires. Pp. 69-75 *in* G. Wuerthner, ed. Widlfire – A century of failed forest policy. Island Press, Covelo, CA.

Keeley, J.E., C.D. Allen, J. Betancourt, G.W. Chong, C.J. Fotheringham, and H.D. Safford. 2006. A 21st century perspective on postfire seeding. Journal of Forestry 104:1-2.

Kie, J.G., R.T. Bowyer, M.C. Nicholson, B.B. Boroski, E.R. Loft. 2002. Landscape heterogeneity at differing scales: effects on spatial distribution of mule deer. Ecology 83: 530-544.

Knight, R.L. and D.N. Cole. 1995a. "Wildlife responses to recreationists" *in* R.L. Knight and K.J. Gutzwiller (eds.), Wildlife and Recreationists: Coexistence Through Management and Research, Washington D.C., Island Press, pp. 51–69.

Knight, R.L. and D.N. Cole. 1995b. "Factors that influence wildlife responses to recreationists" *in* R.L. Knight and K.J. Gutzwiller (eds.), Wildlife and Recreationists: Coexistence Through Management and Research, Washington D.C., Island Press, pp. 71–79.

Knight, R.L. and S.A. Temple. 1995a. "Origin of wildlife responses to recreationists", in R.L. Knight and K.J. Gutzwiller (eds.), Wildlife and Recreationists: Coexistence Through Management and Research, Washington D.C., Island Press, pp. 81–91.

Knight, R.L. and S.A. Temple. 1995b. "Wildlife and recreationists: coexistence through management", in R.L. Knight and K.J. Gutzwiller (eds.), Wildlife and Recreationists: Coexistence Through Management and Research, Washington D.C., Island Press, pp. 327–333.

Landau, D. and S. Stump. Living with Wildlife. San Francisco: Sierra Club Books, 1994.

Leach, E. 2005. Simi Hills' last 2 mountain lions die from anticoagulant. Daily News Mar. 27, 2005.

Lenth, B., M. Brennan, and R.L. Knight. 2006. The effects of dogs on wildlife communities. Report to Bouldeer Country Open Space and Mountain Parks. February, 2006. 29 pp.

Lepczyk, C.A., A.G. Mertig, and J. Liu. 2003. Landowners and cat predation across rural-to-urban landscapes. Biological Conservation 115: 191–201.

Linders, M.J., and D.W. Stinson. 2006. Washington state recovery plan for the western gray squirrel. Washington Department of Fish and Wildlife Draft. 91 pp.

Lockwood, C. 2004. Let there (not) be light. Planning 70: 22–24.

Longcore, T. and Rich, C. 2004. Ecological light pollution. Frontiers in Ecology and the Environment 2: 191–198.

Longcore, T. 2006. Green Visions Plan for 21st Century Southern California: A Guide for Habitat Conservation, Watershed Health, and Recreational Open Space. 8. Conservation of Native Biodiversity in the City: An Assessment of MRCA Projects in the Upper Los Angeles River Watershed, University of Southern California GIS Research Laboratory and Center for Sustainable Cities, Los Angeles, California.

Los Angeles County Veterinary Public Health. n/d. County of Los Angeles Public Health Department. Available online at http://lapublichealth.org/vet/. Retrieved January 2008.

Lyon, L.J., E.S. Telfer, and D.S. Schreiner. 2000*a*. "Direct effects of fire and animal responses" *in* Smith, J.K., ed. Wildland fire in ecosystems: Effects of fire on fauna. Gen. Tech. Rep. RMRS-GTR-42. Pp. 17-23

Lyon, L.J., M.H. Uff, E.S. Telfer, D.S. Schreiner,, and J.K. Smith. 2000*b*. "Fire effects of animal populations" *in* Smith, J.K., ed. Wildland fire in ecosystems: Effects of fire on fauna. Gen. Tech. Rep. RMRS-GTR-42. Pp. 25-34

Mainini, B., P. Neuhaus, P. Ingold. 1993. Behavior of marmots *Marmota marmota* under the influence of different hiking activities. Biological Conservation 64: 161-164.

Mannan, R.W., and Boal, C.W., 2004, "Birds of prey in urban landscapes" *in* N. Fascione, A. Delach and M.E. Smith (eds.), People and Predators: From Conflict to Coexistence, Washington D.C., Island Press.

Martino, D., C. S. Lam, and T. Longcore. 2005. Green Visions Plan for 21st Century Southern California: A Guide for Habitat Conservation, Watershed Health, and Recreational Open Space. 5. Target Species for Habitat Conservation Planning. University of Southern California GIS Research Laboratory and Center for Sustainable Cities, Los Angeles, California.

Martino, D., T. Longcore, and J. Wolch. 2006. Park Visitor User Survey for the Puente Hills Landfill Native Habitat Preservation Authority. University of Southern California, Center for Sustainable Cities, Los Angeles, California.

Mathewson, P., S. Spehar, and D.S. Cooper. 2007. A preliminary large mammal and herptile survey of Griffith Park, Los Angeles, California. Report to City of Los Angeles Department of Parks and Recreation. 15 August 2007.

McGeoch, M. 1998. The selection, testing and application of terrestrial insects as bioindicators. Biological Reviews 73: 181–201.

McKinney, M.L., 2002. Urbanization, Biodiversity, and Conservation, Bioscience 52: 883–890.

Meffe, G. and C. Carroll. 1994. Principles of conservation biology. Sinauer Associates, Inc. Sunderland, MA, USA.

Melendrez Design Partners. 2004. Griffith Park Master Plan. 2nd draft. Available online at http://www.lacity.org/RAP/dos/parks/griffithPK/masterplan2005/masterplan2005.htm. Retrieved Sept. 2007.

Miller, G. 2000. Urban wildlife and habitat management plan. 2000 Update. Seattle Department of Parks and Recreation. Available online at: http://www.seattle.gov/parks/Publications/urbanwildlife.htm. Retrieved December 2007.

Miller, J.R. and N.T. Hobbs. 2000. Recreational trails, human activity and nest predation in lowland riparian areas. Landscape and Urban Planning 50: 227–236.

Miller, S.G., R.L. Knight, C.K. Miller. 2001. Wildlife responses to pedestrians and dogs. Wildlife Society Bulletin 29: 124-132.

Montalvo, A. M., and N. C. Ellstrand. 2000. Fitness consequences of non-local transplantation: preliminary tests of the home team advantage and outbreeding depression hypotheses. *in* J. E. Keeley, M. Baer-Keeley, and C. J. Fotheringham, ed. 2nd Interface Between Ecology and Land Development in California. U.S. Geological Survey open-file report 00-62. Sacramento, CA. Pp 227-236.

Multiple Species Habitat Conservation Plan (n/d). Understanding the plants and animals of the Western Riverside County Multiple Species Habitat Conservation Plan. Available online at http://ecoregion.ucr.edu/list.asp?cat_id=0&ordering=name. Retrieved January, 2008.

Neale, J. and B. Sacks. 2001. Resource utilization and interspecific relations of sympatric bobcats and coyotes. Oikos 94: 236–250.

Nelson, S.H., A.D. Evans, and R.B. Bradbury. 2005. The efficacy of collar-mounted devices in reducing the rate of predation of wildlife by domestic cats. Applied Animal Behaviour Science 94: 273–285.

Opler, P.A., H. Pavulaan, R.E. Stanford, and M. Pogue. 2006. Butterflies and Moths of North America. Bozeman, MT: Mountain Prairie Information Node. Available online at http://www.butterfliesandmoths.org/ Retrieved December, 2007.

Orams, M.B. 2002. Feeding wildlife as a tourism attraction: A review of the issues and impacts. Tourism Management 23: 281–293.

Osterling, R.S. 1997. Sunshine Canyone mitigation oaks—a success story. Pp. 251-256 *in* Pillsbury et al. Proceedings of a symposium on oak woodlands: ecology,

management, and urban interface issues. Gen. Tech. Rep. PSW-GTR-160.

Penrod, K. 2000. Missing Linkages: Restoring connectivity to the California landscape. Conference proceedings. Nov. 2, 2000. San Diego Zoo, San Diego, CA.

Penrod, K., C. Cabanero, P. Beier, C. Luke, W. Spencer, E. Rubin, R. Sauvajot, S. Riley, D. Kamradt. 2006. South Coast Missing Linkages Project: A linkage design for the Santa Monica-Sierra Madre connection. Produced by South Coast Wildlands, Idyllwild, CA.

Peters, H.A. , N.R. Chiariello, H.A. Mooney, S.A. Levin, and A.E. Hartley. 2005. Native harvester ants threatened with widespread displacement exert localized effects on serpentine grassland plant community composition. Oikos 109: 351-359.

Pilliod, D.S., R.B. Bury, E.J. Hyde, C.A. Pearl, and P.S. Corn. 2003. Fire and amphibians in North America. Forest Ecology and Management 178: 163-181.

Plumb, T.R. and M.D. De Lasaux. 1997. An evaluation of coast live oak regeneration techniques. Pp. 231-242 *in* Pillsbury et al. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. Gen. Tech. Rep. PSW-GTR-160.

Radle, A.L. 1998, "The effect of noise on wildlife: a literature review." Updated 2007. Available online at: http://interact.uoregon.edu/MediaLit/wfae/library/articles/radle_effect_noise_wildlife.pdf. Retrieved December, 2007.

Remington, S. 2006. Bat surveys of the Puente Hills. Puente Hills Landfill Native Habitat Preservation Authority Final Report. 39 pp.

Riley, S.P.D., J. Hadidian, and D.A. Manski. 1998. Population density, survival, and rabies in raccoons in an urban national park. Canadian Journal of Zoology: 1153–1164.

Riley, S.P.D., R. Sauvajot, T. Fuller, E. York, D. Kamradt, C. Bromley and R Wayne. 2003. Effects of urbanization and habitat fragmentation on bobcats and coyotes in southern California. Conservation Biology 17: 566–577.

Riley, S.P.D., C. Bromley, R.H. Poppenga, F.A. Uzal, L. Whited, and R.M. Sauvajot. 2007. Anticoagulant exposure and notoedric mange in bobcats and mountain lions in urban southern California. Journal of Wildlife Management 71:1874-1884.

Riparian Habitat Joint Venture. 2004. Version 2.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/pdfs/riparian.v-2.pdf.

Robichaud, P.R., J.L. Beyers, D.G. Neary. 2000. Evaluating the effectiveness of postfire rehabilitation treatments. Gen. Tech Rep. RMRS-GTR-63.

Rosatte, R.C., M.J. Power, and C.D. MacInnes. 1991. "Ecology of skunks, raccoons and foxes in Metropolitan Toronto", *in* L.W. Adams and D.L. Leedy (eds.), Wildlife Conservation in Metropolitan Environments: Proceedings of a National Symposium of Urban Wildlife, Columbia, Md., National Institute for Urban Wildlife.

Russell, K.R., D.H. Van Lear, and D.C.J. Guynn. 1999. Prescribed fire effects on herpetofauna: a review and management implications. Wildlife Society Bulletin 27: 374-384.

Ruxton, G.D., S. Thomas, and J.W. Wright. 2002. Bells reduce predation of wildlife by domestic cats. Journal of Zoology 256: 81–83.

Saab, V.A. and H.D.W. Powell. 2005. Fire and avian ecology in North America: Process influencing pattern. Studies in Avian Biology 30: 1-13.

Sabo, J.L. and M.E. Power. 2002. River-watershed exchange: effects of riverine subsidies on riparian lizards and other terrestrial prey. Ecology 83: 1860-1869.

Sanders, N.J., and D.M. Gordon. 2004. The interactive effects of climate, life history, and interspecific neighbours on mortality in a population of seed harvester ants. Ecological Entomology 29: 632-637.

Savard, J.-P.L., P. Clergeau, and G. Mennechez. 2000. Biodiversity concepts and urban ecosystems. Landscape and Urban Planning 48: 131–142.

Schwilk, D.W. and J.E. Keeley. 1998. Rodent populations after a large wildfire in California chaparral and coastal sage scrub. The Southwestern Naturalist 43: 480-483.

Sears, A.R. and S.H. Anderson. 1991. "Correlations between birds and vegetation in Cheyenne, Wyoming", *in* L.W. Adams and D.L. Leedy (eds.), Wildlife Conservation in Metropolitan Environments: Proceedings of a National Symposium of Urban Wildlife, Columbia, Md., National Institute for Urban Wildlife.

Seymour, M. 2005. Green Visions Plan for 21st Century Southern California: A Guide for Habitat Conservation, Watershed Health, and Recreational Open Space. 6. "Nuisance" Urban Wildlife. University of Southern California GIS Research Laboratory and Center for Sustainable Cities, Los Angeles, California.

Seymour, M., J. Byrne, D. Martino and J. Wolch. 2006. Green Visions Plan for 21st Century Southern California: A Guide for Habitat Conservation, Watershed Health, and Recreational Open Space. 9. Recreationist-Wildlife Interactions in Urban Parks, University of Southern California GIS Research Laboratory and Center for Sustainable Cities, Los Angeles, California.

Shine, R and J. Koenig. 2001. Snakes in the garden: an analysis of reptiles "rescued" by community-based wildlife carers. Biological Conservation 102: 271-283.

Sime, C.A.. 1999. Effects of recreation on Rocky Mountain wildlife. Montana Chapter of the Wildlife Society. 17 pp.

Sisk, T.D., N.M. Haddad, and P.R. Ehlich. 1997. Bird assemblages in patchy woodlands: modeling the effects of edge and matrix habitats. Ecological Applications 7:1170-1180.

Stanton, P.A. 1986. Comparison of avian community dynamics of burned and unburned coastal sage scrub. Condor 88: 285-289.

Stebbins, R.C. 2003. Peterson Field Guides: Western Reptiles and Amphibians, Third Edition. Houghton Mifflin Company, New York. 336 pp.

Suarez, A.V., K.S. Pfennig, and S.K. Robinson. 1997. Nesting success of a disturbance-dependent songbird on different kinds of edges. Conservation Biology 11: 928-935.

Suarez, A.V., D.T. Bolger, and T.J. Case. 1998. Effects of fragmentation and invasion on native ant communities in coastal southern California. Ecology 79: 2041-2056.

Suarez, A.V., J.Q. Richmond, and T.J. Case. 2000. Prey selection in horned lizards following the invasion of Argentine ants in southern California. Ecological Applications 10:711–725.

Suarez, A. and T. Case. 2002. Bottom-up effects on persistence of a specialist predator: Ant invasions and horned lizards. Ecological Applications 12: 291–298.

Taylor, A. R. and R.L. Knight. 2003. Wildlife responses to recreation and associated visitor perceptions. Ecological Applications 13: 951-963.

Thorsnes, P. 2002. The value of a suburban forest preserve: estimates from sales of vacant residential building lots. Land Economics 78: 426–441.

Tigas, L.A., D.H. Van Vuren, and R.M. Sauvajot. 2002. Behavioral responses of bobcats and coyote to habitat fragmentation and corridors in an urban environment. Biological Conservation 108: 299-306.

Tietje, W.D., P.H. Bloom, and J.K. Vreeland. 1997*a*. Characteristics of red-tailed hawk nest sites in oak woodlands of central California. Pp. 365-372 *in* Pillsbury et al. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. Gen. Tech. Rep. PSW-GTR-160.

Tietje, W.D., T.C. Berlund, S.L. Garcia, C.G. Halpin, and W.A. Jensen. 1997*b*. Contribution of downed woody material by blue, valley, and coast live oaks in central California. Pp. 423-430 *in* Pillsbury et al. Proceedings of a symposium on oak woodlands: ecology, management, and urban interface issues. Gen. Tech. Rep. PSW-GTR-160.

Toyon Canyon Landfill (n/d). Available online at http://www.lacitysan.org/srecd/TCPage.htm. Retrieved December 2007.

Tyler, C.M., B.E. Mahall, F.W. Davis, and M. Hall. 2002. Factors limiting recruitment in valley and coast live oak. Pp. 565-572 *in* Standiford, Richard B., et al, tech. editor. Proceedings of the Fifth Symposium on Oak Woodlands: Oaks in California's Challenging Landscape. Gen. Tech. Rep. PSW-GTR-184.

United States Census 2000. Available online at http://www.census.gov/main/www/cen2000.html. Retrieved Sept. 2007.

United States EPA. 2003. Endangered and threatened wildlife and plants; status review and 12-month finding for a petition to list the Washington population of the Wesgtern gray squirrel. Federal Register 68: 34628-34640.

Vreeland, J.K. and W.D. Tietje. 2002. Numerical response of small vertebrates to prescribed fire in California oak woodland. Pp. 100-110 *in* W.M. Ford, K.R. Russell, and C.E. Moorman, eds. The role of fire in nongame wildlife management and community restoration: traditional uses and new directions. General technical report NE-GTR-288. U.S. Forest Service, Newton Square, PA.

Way, J., I. Ortega, and E. Strauss. 2004. Movement and activity patterns of eastern coyotes in a coastal, suburban environment. Northeastern Naturalist 11:237–254.

Whittaker, D. and R.L. Knight. 1998. Understanding wildlife responses to humans. Wildlife Society Bulletin 26: 312-317.

Yalden, P.E. and D.W. Yalden. 1990. Recreational disturbance of breeding golden plovers *Pluvialis apricarius*. Biological Conservation 51: 243–262.

Wagner, D., J.B. Jones, and D.M. Gordon. 2004. Development of harvester ant colonies alters soil chemistry. Soil Biology and Biochemistry 36: 797-804.

Wingert, W.A., and L. Chan. 1988. Rattlesnake bites in southern California and rationale for recommended treatment. Western Journal of Medicine 148: 37-44.

Weiss, H.B. D.I. Friedman, and J.H. Coben. 1998. Incidence of dog bite injuries treated in emergency departments. Journal of the American Medical Association. 279: 51-53.

Zacharias, M and J. Roff. 2001. Use of focal species in marine conservation and management: A review and critique. Aquatic Conservation: Marine and Freshwater Ecosystems 11: 59–76.

Appendix I. Existing Legal Ordinances Protecting Griffith Park's Wildlife.

California State Law:

"The preservation, protection and restoration of wildlife within the State is an inseparable part of providing adequate recreation for our people in the interest of public welfare; and it is the policy of the State to acquire and restore to the highest possible level, and maintain in a state of high productivity, those areas that can be most successfully used to sustain wildlife and which will provide adequate and suitable recreation." (**Wildlife Conservation Law of 1947, Cal. Fish & Game Code § 1301 (2007)**)

"It is hereby declared to be the policy of the state to encourage the preservation, conservation, and maintenance of wildlife resources under the jurisdiction and influence of the state. This policy shall include the following objectives: (a) To maintain sufficient populations of all species of wildlife and the habitat necessary to achieve the objectives in subdivisions (b), (c), and (d). (b) To provide for the beneficial use and enjoyment of wildlife by all citizens of the state. (c) To perpetuate all species of wildlife for their intrinsic and ecological values, as well as for their direct benefits to all persons. (d) To provide for aesthetic, educational, and nonappropriative uses of the various wildlife species." (**Cal. Fish & Game Code § 1801 (2007)**).

"It is the policy of this state to conserve its natural resources and to prevent the willful or negligent destruction of birds, mammals, fish, reptiles, or amphibia." (**Cal. Fish & Game Code § 2014(a) (2007))**

"The Legislature further finds and declares that it is the policy of the state to:…(c) Prevent the elimination of fish or wildlife species due to man's activities, insure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history. (d) Ensure that the long-term protection of the environment, consistent with the provision of a decent home and suitable living environment for every Californian, shall be the guiding criterion in public decisions." (**Cal. Pub. Res. Code § 21001(2007)**).

Los Angeles Municipal Code:

Animal Control
"No person shall have, keep or maintain any wild, exotic, dangerous or non-domestic animal or reptile without first applying to and receiving from the Department a permit so to do." (**Los Angeles, Cal., Mun. Code, § 53.38 (2007)**).

"No person shall place, leave or expose, in any place accessible to birds, fowls, domestic animals, dogs, cats or other such animals with the intent to kill or harm such birds, fowls, or animals, any poisonous substance or ingredient, or any edible or any other substance or ingredient which has in any manner been treated or prepared with any poisonous substance or ingredient." (**Los Angeles, Cal., Mun. Code, § 53.41 (2007)**).

"Every person owning or having charge, care, custody or control of any dog shall keep such

dog exclusively upon his own premises provided, however, that such dog may be off such premises if it be under the control of a competent person and restrained by a substantial chain or leash not exceeding six feet in length, or under the control of a competent person on a dog exercise or training area" (**Los Angeles, Cal., Mun. Code, § 53.06.2a (2007)**).

"No person shall set, or cause to be set, any trap to catch any animal, other than rats, mice, pocket gophers, ground squirrels and moles, without having first obtained a permit therefor from the Department prior to the setting of any such trap." (**Los Angeles, Cal., Mun. Code, § 53.06.3a (2007)**).

"When any of the following described animals are found to be at large upon any public property, street, highway or alley, or are found to be at large upon private property and molesting, injuring, damaging or threatening to injure or damage any persons or property such animals may be taken up by the General Manager or his authorized representative and summarily destroyed: Badgers, bobcats, cougars, coyotes, opossums, foxes, raccoons, poisonous reptiles, skunks, or weasels." (**Los Angeles, Cal., Mun. Code, § 53.06.4 (2007)**)

"No person shall feed or in any manner provide food or cause to be fed any non-domesticated mammalian predator including, but not limited to, coyotes, foxes, possums, raccoons and skunks." (**Los Angeles, Cal., Mun. Code, § 53.06.5a (2007)**).

"It shall be unlawful for the owner or person having custody of any dog to fail to immediately remove and dispose of in a sanitary manner, by replacing in a closed or sealed container and depositing in a trash receptacle, any feces deposited by such dog upon public or private property, without the consent of the public or private owner or person in lawful possession of the property, other than property owned or controlled by the owner or person having custody of such dog." (**Los Angeles, Cal., Mun. Code, § 53.49 (2007)**).

"Every person who owns or harbors any dog over the age of four months in the city shall have such dog vaccinated against rabies by a duly licensed veterinarian of his choice, or at a Vaccination Clinic sponsored by the Southern California Veterinary Medical Association." (**Los Angeles, Cal., Mun. Code, § 53.51 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall cause, permit or allow any animal owned or possessed by him or any animal in his care, custody or control to be present in said park except: (a) Equine animals being led or ridden under reasonable control upon bridle paths or trails provided for such purposes; or … (d) Dogs or cats when led by a leash not more than six (6) feet long, or when confined within the interior of a vehicle, or dogs under the control of a competent person in designated dog exercise and training areas." (**Los Angeles, Cal., Mun. Code, § 63.44.B.2 (2007)**).

Conservation

"No person shall kill any song bird or destroy or rob the nest of any such bird." (**Los Angeles, Cal., Mun. Code, § 53.48 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall take, seize or hunt any bird, animal or fish except that lost or escaped dogs, cats or horses may be searched for." (**Los Angeles, Cal., Mun. Code, § 63.44.B.11 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall remove any wood, tree, shrub, plant, turf, grass, soil, rock, sand or gravel." (**Los Angeles, Cal., Mun. Code, § 63.44.B.12 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person, without permission from the Board or the Department of Recreation and Parks, shall cut, break, injure, tamper with, deface or disturb any tree, shrub, plant, rock, building, cage, pen, monument, fence, bench, structure, apparatus, equipment or property; or mark, paint, post or write upon any building, monument, fence, bench or other structure." (**Los Angeles, Cal., Mun. Code, § 63.44.B.13 (2007)**).

Litter/Public Nuisance

"No person shall camp, lodge, make or kindle a fire, wash any clothes or bedding, bathe, sleep, lay any bed or any blanket, quilt, straw or branches for the purpose of resting or sleeping thereon, or remain or loiter in the official bed of the Los Angeles River." (**Los Angeles, Cal., Mun. Code, § 41.22 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall play or utilize any sound amplifying system except within or upon an area or facility set aside for such purpose by the Board, Department or Commission. For the purposes of this and the next subdivision, "**sound amplifying system**" shall mean and include any system of electrical hookup or connection, loud speaker system or equipment, sound amplifying system, and any apparatus, equipment, device, instrument, or machine designed for or intended to be used for the purpose of amplifying the sound or increasing the volume of the human voice, musical tone, vibration or sound wave. This subdivision shall not apply to the regular and customary use of portable radios, televisions, record players or tape recorders played or operated in such places and at such times so as not to disturb other persons in their permitted uses of the park." (**Los Angeles, Cal., Mun. Code, § 63.44.B.4 (2007)**).

Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall enter, remain, stay or loiter in any park between the hours of 10:30 o'clock p.m. and 5:00 o'clock a.m. of the following day. On any public park or recreational facility subject to this section, the supervising employee at such site may extend the 10:30 p.m. closing time for up to one hour to accommodate any departmentally approved event." (**Los Angeles, Cal., Mun. Code, § 63.44.B.13a (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and

controlled property within the City of Los Angeles: No person shall make or kindle a fire or cook food, except on a stove or masonry or concrete hearth or fire circle provided for such purpose, or on a portable stove or hearth of an approved type and in areas specifically posted for such use" **(Los Angeles, Cal., Mun. Code, § 63.44.B.17 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall throw, discard or deposit any paper, rubbish, debris, ashes, dirt, bottles, cans, trash or litter of any kind or nature whatsoever, except in receptacles specifically provided therefore." (**Los Angeles, Cal., Mun. Code, § 63.44.B.19 (2007)**).

"Within the limits of any park or other City-owned Harbor Department designated and controlled property within the City of Los Angeles: No person shall appear, bathe, sunbathe, walk or be in any public park, playground, beach or the waters adjacent thereto, in such a manner that the genitals, vulva, pubis, pubic symphysis, pubic hair, buttock, natal cleft, perineum, anus, anal region, or pubic hair region of any such person, or any portion of the breast at or below the upper edge of the areola thereof of any such female person, is exposed to public view or is not covered by an opaque covering." (**Los Angeles, Cal., Mun. Code, § 63.44.B.20 (2007)**).

"(a) It shall be unlawful for any person within any zone of the City to use or operate any radio, musical instrument, phonograph, television receiver, or other machine or device for the producing, reproducing or amplification of the human voice, music, or any other sound, in such a manner, as to disturb the peace, quiet, and comfort of neighbor occupants or any reasonable person residing or working in the area. (b) Any noise level caused by such use or operation which is audible to the human ear at a distance in excess of 150 feet from the property line of the noise source, within any residential zone of the City or within 500 feet thereof, shall be a violation of the provisions of this section." (**Los Angeles, Cal., Mun. Code, § 112.01(a-b) (2007)**).

Appendix II. Wildlife Species Lists.

Note: "official" checklists of the wildlife of the Santa Monica Mountains (SMM) may be downloaded here: http://www.nps.gov/samo/naturescience/animals.htm

		Mammals and herptiles of Griffith Park				
		Resident elsewhere in eastern Santa Monica Mtns.; suitable habitat at Griffith Park but no records				
		Recorded historically from Griffith Park or vicinity; status in park unknown				
		Presumed extirpated based on large size/ease of detection and lack of recent/consistent records				
		Species	**Common name**	**Last recorded**	**Documentation**	**Location/Notes**
Mammals						
1		*Didelphis virginiana*	Virginia opossum	2007	Mathewson et al. (in press)	
2		*Notisorex crawfordi*	Desert shrew	N/A		Appears on SMM checklist
3		*Sorex ornatus*	Ornate shrew	N/A		Appears on SMM checklist
4		*Scapanus latimanus occultus*	Broad-footed mole	2006	LACM (multiple specimens); K. Dearborn, Los Angeles Zoo, via email, 2007.	"Los Angeles; Griffith Park"
5		*Antrozous pallidus*	Pallid bat (CSC)	N/A		Appears on SMM checklist
6		*Eptesicus fuscus bernardinus*	Big brown bat	2003	K. Dearborn, Los Angeles Zoo, via email, 2007; LACM 10717 (from 1944)	1944 specimen from "Griffith Park Zoo"
7		*Lasiurus cinereus cinereus*	Hoary Bat	1928	LACM 9425	"Hollywood"
8		*Myotis californicus*	California myotis	N/A		Appears on SMM checklist
9		*Myotis yumanensis*	Yuma myotis	N/A		Appears on SMM checklist
10		*Pipistrellus hesperus*	Western pipistrelle	N/A		Appears on SMM checklist
11		*Eumops perotis californicus*	Western mastiff bat (CSC)	1991	LACM 94011	"Hollywood"
12		*Tadarida brasiliensis mexicana*	Mexican free-tailed bat	2003	K. Dearborn, Los Angeles Zoo, via email, 2007; LACM 91737 (from 1990)	1990 specimen from "Los Angeles River; 1 km E Hwy 2"
13		*Procyon lotor psora*	Raccoon	2007	Mathewson et al. (in press)	
14		*Bassariscus astutus octavus*	Ringtail	1935	LACM 4297	"Los Angeles; Hollywood Hills"
15		*Mephitis mephitis holzneri*	Striped skunk	2007	Mathewson et al. (in press)	
16		*Spilogale putorius phenax*	Spotted skunk	1929	LACM 1203	"Los Angeles; Griffith Park"; also, two 1941 specimens from "Hollywood Dam".
17		*Mustela frenata latirostra*	Long-tailed Weasel	1941	LACM 8089	"Hollywood Hills"
18		*Canis latrans ochropus*	Coyote	2007	Mathewson et al. (in press)	
19		*Urocyon cinereoargenteus californicus*	Gray fox	2007	Mathewson et al. (in press)	
20		*Vulpes vulpes fulva**	Red fox*	1969	(LACM 52201)	"North Hollywood; Universal City" (not established and presumably absent).

21		*Lynx rufus californicus*	Bobcat	2007	Mathewson et al. (in press)	
22		*Puma concolor*	Mountain Lion	N/A		No confirmed records
23		*Sciurus griseus anthonyi*	Western gray squirrel	2007	DSC, pers. obs.	
24		*Sciurus niger**	Eastern fox squirrel*	2007	DSC, pers. obs.	
25		*Spermophilus beecheyi beecheyi*	California ground squirrel	2007	DSC, pers. obs.	
26		*Thomomys bottae bottae*	Botta's pocket-gopher	2007	DSC, pers. obs.	
27		*Chaetodipus californicus dispar*	California pocket mouse	1941	LACM 20564	"Griffith Park"
28		*Microtus californicus*	California vole	N/A		Appears on SMM checklist
29		*Neotoma fuscipes macrotis*	Dusky-footed woodrat	1997	LACM (multiple specimens)	Vista del Valle Dr.
30		*Neotoma lepida intermedia*	San Diego desert woodrat (CSC	1997	LACM (multiple specimens)	Vista del Valle Dr.
31		*Peromyscus californicus insignis*	California mouse	1941	LACM (multiple specimens)	"Ferndell, Griffith Park"
32		*Peromyscus eremicus fraterculus*	Cactus mouse	1941	LACM (multiple specimens)	"Griffith Park"
33		*Peromyscus maniculatus*	Deer mouse	N/A		Appears on SMM checklist
34		*Reithrodontomys megalotis longicaudus*	Western harvest mouse	1941	LACM (multiple specimens)	"Ferndell, Griffith Park"
35		*Mus musculus**	House mouse*	1941	LACM 20582	"Griffith Park"
36		*Rattus norvegicus**	Norway rat*	N/A		Common throughout Los Angeles
37		*Rattus rattus**	Black rat*	N/A		Common throughout Los Angeles
38		*Sylvilagus audubonii sanctidiegi*	Desert cottontail	2007	DSC, pers. obs.	
39		*Sylvilagus bachmani cinerascens*	Brush rabbit	1933	LACM 30780	"Los Angeles; Griffith Park"
40		*Odocoileus hemionus californica*	Mule deer	2007	Mathewson et al. (in press)	
Amphibians (names follow Stebbins 2003)						
1		*Aneides lugubris*	Arboreal Salamander	1922	USNM 93612	"Griffith Park"; also, two individuals found within last 5 years at Los Angeles Zoo, *per* I. Recchio
2		*Batrachoseps nigriventris*	Black-bellied slender-salamander	2007	DSC, pers. obs.	
3		*Batrachoseps major*	Garden slender-salamander	1941	LACM 731	"Griffith Park, Los Angeles"
4		*Ensatina eschscholtzii eschscholtzii*	Monterey Ensatina	1922	USNM 93609	"Los Angeles, Griffith Park"
5		*Taricha torosa*	Coast Range newt (CSC)	1946	MVZ 42425	"Hollywood Hills"; unknown to De Lisle et al. (1986) east of Coldwater Canyon.
6		*Bufo boreas*	Western toad	2007	I. Recchio photograph.	Los Angeles Zoo
7		*Hyla regilla*	Pacific chorus-frog	2007	DSC, pers. obs.	
8		*Rana catesbeiana**	Bullfrog*	1992	LACM 139920	"Los Angeles River, end of Newell St; ~1 km downstream of Glendale Frwy".

Reptiles (names follow Stebbins 2003)						
1		*Eumys marmorata*	Western pond turtle (CSC)	1917	LACM 8012	"Los Angeles River, Lankersheim"; unknown east of Coldwater Canyon by De Lisle et al. (1986).
2		*Elgaria multicarinata*	Southern alligator lizard	2007	P. Mathewson, unpubl. data, photograph.	
3		*Aniella pulchra*	California legless lizard (CSC)	1965	LACM 131563	"Griffith Park"; mentioned by local resident as occurring near Los Angeles River in residential Burbank (to DSC, late 2007).
4		*Phrynosoma coronatum*	Coast horned lizard (CSC)	1919	MVZ 7863	"1 mi S Lankersheim"; at least one recent sighting from upper elevations of park (to DSC).
5		*Sceloporus occidentalis*	Western fence lizard	2007	P. Mathewson, unpubl. data, photograph.	
6		*Uta stansburiana*	Side-blotched lizard	1941	LACM 5006	"Los Angeles, Griffith Park"; Recorded as "verified in 1985 by in-hand specimen taken and released" by De Lisle et al. (1986).
7		*Eumeces skiltonianus*	Skilton's (western) skink	2007	P. Mathewson, unpubl. data, photograph.	
8		*Cnemodophorus tigris stejnegeri*	Coastal whiptail (CSC)	2007	P. Mathewson, unpubl. data, photograph.	
9		*Coluber contrictor mormon*	Western yellow-bellied racer	N/A		De Lisle et al. (1986) considered this species extirpated from Laurel Cyn. by 1975; single specimen collected within past 5 years from Elysian Park (later released), Ian Recchio, pers. comm.); Appears on SMM checklist.
10		*Crotalus viridis helleri*	Pacific rattlesnake	2007	P. Mathewson, unpubl. data, photograph.	
11		*Diadophis punctatus modestus*	San Bernardino ringneck snake (CSC)	1959	LACM 2298	Also present in Debs Park, Los Angeles, in late 1990s (D.S. Cooper, unpubl. data).
12		*Hypsiglena torquata*	California nightsnake	N/A		Specimens from central Santa Monica Mtns.
13		*Lampropeltis getulus californiae*	California kingsnake	2007	A. Torres, photograph.	
14		*Lampropeltis zonatus pulchra*	San Diego mountain kingsnake (CSC)	N/A		De Lisle et al. (1986) lists as occurring in Franklin and Coldwater Cyn. "extinct by 1975" or "not verified"; S. Harris wrote of seeing an individual in Coldwater Cyn. c. 1990; Appears on SMM checklist.
15		*Masticophis flagellum piceus*	Red coachwhip	N/A		De Lisle et al. (1986) lists as occurring in Franklin Cyn. "extinct by 1975" or "not verified"; Appears on SMM

						checklist.
16		*Masticophis lateralis lateralis*	Chaparral (California) whipsnake	2007	P. Mathewson, unpubl. data, photograph.	
17		*Pituophis melanoleucus annectens*	Pacific gopher snake	2007	K. Dearborn, Los Angeles Zoo, via email, 2007;	
18		*Thamnophis hammondii*	Two-striped gartersnake	1940	USNM 307833	"Los Angeles, Griffith Park"; also a 1991 record (LACM 139923) from "Los Angeles River, near Glendale Frwy offramp; 100-200 below Glendale Frwy offramp & overcrossing of river; SW side of river on levee". LACM specimen catalogued as T. couchi ("western aquatic garter-snake"; formerly considered a subspecies of this taxon, which is now reserved for the "Sierra gartersnake" of the Sierra Nevada).
19		*Trimorphodon biscutatus lambda*	Sonoran (western) lyresnake	N/A		De Lisle et al. (1986) considered this species extirpated/not verified from Beverly Hills prior to 1975; Appears on SMM checklist.

Regularly-occurring bird species of Griffith Park
(includes winter, summer and permanent residents)

Recorded historically from Griffith Park or vicinity; status in park unknown

Presumed extirpated based on large size/ease of detection and lack of recent/consistent records

			Status	Season	Nests? (53 spp.)
1	*Branta canadensis*	Canada Goose		Winter	
2	*Aix sponsa*	Wood Duck		Winter	
3	*Anas strepera*	Gadwall		Winter	
4	*Anas americana*	American Wigeon		Winter	
5	*Anas platyrhynchos*	Mallard		Year-round	Yes
6	*Anas discors*	Blue-winged Teal		Winter	
7	*Anas cyanoptera*	Cinnamon Teal		Year-round	Yes
8	*Anas clypeata*	Northern Shoveler		Winter	
9	*Anas acuta*	Northern Pintail		Winter	
10	*Anas crecca*	Green-winged Teal		Winter	
11	*Bucephala albeola*	Bufflehead		Winter	
12	*Bucephala clangula*	Common Goldeneye		Winter	
13	*Lophodytes cucullatus*	Hooded Merganser		Winter	
14	*Oxyura jamaicensis*	Ruddy Duck		Winter	
15	*Podilymbus podiceps*	Pied-billed Grebe		Year-round	
16	*Podiceps nigricollis*	Eared Grebe		Winter	
17	*Phalacrocorax penicillatus*	Double-crested Cormorant		Year-round	
18	*Ardea herodias*	Great Blue Heron		Year-round	
19	*Ardea alba*	Great Egret		Year-round	
20	*Egretta thula*	Snowy Egret		Year-round	
21	*Butorides virescens*	Green Heron		Year-round	
22	*Nycticorax nycticorax*	Black-crowned Night-Heron		Year-round	
23	*Cathartes aura*	Turkey Vulture		Year-round	
24	*Pandion haliaetus*	Osprey		Winter	
25	*Accipiter striatus*	Sharp-shinned Hawk		Winter	
26	*Accipiter cooperii*	Cooper's Hawk		Year-round	Yes
27	*Buteo lineatus*	Red-shouldered Hawk		Year-round	Yes
28	*Buteo jamaicensis*	Red-tailed Hawk		Year-round	Yes
29	*Falco sparverius*	American Kestrel		Winter	
30	*Falco columbarius*	Merlin		Winter	
31	*Callipepla californica*	California Quail		Year-round	Yes
32	*Porzana carolina*	Sora	RR	Winter	
33	*Fulica americana*	American Coot		Year-round	Yes
34	*Gallinula chlorops*	Common Moorhen	RR	Winter	
35	*Charadrius vociferus*	Killdeer		Year-round	Yes
36	*Himantopus mexicanus*	Black-necked Stilt		Year-round	Yes
37	*Tringa melanoleuca*	Greater Yellowlegs		Winter	
38	*Actitis macularia*	Spotted Sandpiper	RR	Year-round	Yes
39	*Calidris minutilla*	Least Sandpiper		Winter	
40	*Gallinago gallinago*	Wilson's Snipe		Winter	
41	*Larus californicus*	California Gull		Winter	
42	*Larus delawarensis*	Ring-billed Gull		Winter	
43	*Larus occidentalis*	Western Gull		Winter	
44	*Geococcyx californianus*	Greater Roadrunner		(Year-round)	

45	*Columba livia**	Rock Pigeon*		Year-round	
46	*Columba fasciata*	Band-tailed Pigeon		Year-round	
47	*Zenaida macroura*	Mourning Dove		Year-round	Yes
48	*Brotogeris chiriri**	Yellow-chevroned Parakeet*		Year-round	
49	*Bubo virginianus*	Great Horned Owl		Year-round	
50	*Phalaenoptilus nuttallii*	Common Poorwill	RR?	Summer	
51	*Chaetura vauxi*	Vaux's Swift		Winter	
52	*Aeronautes saxatalis*	White-throated Swift		Year-round	Yes
53	*Archilochus alexandri*	Black-chinned Hummingbird		Summer	Yes
54	*Calypte anna*	Anna's Hummingbird		Year-round	Yes
55	*Salasphorus sasin*	Allen's Hummingbird		Year-round	
56	*Ceryle alcyon*	Belted Kingfisher		Winter	
57	*Melanerpes formicivorus*	Acorn Woodpecker		Year-round	Yes
58	*Sphyrapicus ruber*	Red-breasted Sapsucker		Winter	
59	*Picoides nuttallii*	Nuttall's Woodpecker		Year-round	Yes
60	*Picoides pubescens*	Downy Woodpecker		Year-round	Yes
61	*Colaptes auratus*	Northern Flicker		Winter	
62	*Colaptes auratus*	Northern Flicker	RR?	Summer	
63	*Contopus sordidulus*	Western Wood-pewee	RR?	Summer	
64	*Empidonax difficilis*	Pacific-slope Flycatcher		Summer	Yes
65	*Sayornis nigricans*	Black Phoebe		Year-round	Yes
66	*Sayornis saya*	Say's Phoebe		Winter	
67	*Myiarchus cinerascens*	Ash-throated Flycatcher		Summer	Yes
68	*Tyrannus vociferans*	Cassin's Kingbird		Year-round	
69	*Tyrannus verticalis*	Western Kingbird		Summer	Yes
70	*Lanius ludivicianus*	Loggerhead Shrike	CSC	(Year-round)	
71	*Vireo huttoni*	Hutton's Vireo	RR	Year-round	Yes
72	*Aphelocoma californica*	Western Scrub-Jay		Year-round	Yes
73	*Corvus brachyrhynchos*	American Crow		Year-round	Yes
74	*Corvus corax*	Common Raven		Year-round	Yes
75	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow		Summer	Yes
76	*Petrochelidon pyrrhonota*	Cliff Swallow		Summer	Yes
77	*Pecile gambeli*	Mountain Chickadee		Winter	
78	*Parus inornatus*	Oak Titmouse		Year-round	Yes
79	*Psaltriparus minimus*	Bushtit		Year-round	Yes
80	*Sitta carolinensis*	White-breasted Nuthatch		Winter	
81	Thryomanes bewickii	Bewick's Wren		Year-round	Yes
82	*Troglodytes aedon*	House Wren		Year-round	Yes
83	*Salpinctes obsoletus*	Rock Wren	RR?	Year-round	?
84	*Catherpes mexicanus*	Canyon Wren	RR?	Year-round	?
85	*Regulus calendula*	Ruby-crowned Kinglet		Winter	
86	*Polioptila caerulea*	Blue-gray Gnatcatcher		Winter	
87	*Sialia mexicana*	Western Bluebird		Year-round	Yes
88	*Cathartes guttatus*	Hermit Thrush		Winter	
89	*Turdus migratorius*	American Robin		Year-round	Yes
90	*Chamaea fasciata*	Wrentit		Year-round	Yes
91	*Mimus polyglottos*	Northern Mockingbird		Year-round	Yes
92	*Toxostoma redivivum*	California Thrasher		Year-round	Yes
93	*Sturnus vulgaris**	European Starling*		Year-round	Yes
94	*Bombycilla cedrorum*	Cedar Waxwing		Winter	
95	*Phainopepla nitens*	Phainopepla		Year-round	Yes
96	*Vermivora celata*	Orange-crowned Warbler		Year-round	

97	*Dendroica petechia*	Yellow Warbler	CSC	Summer	
98	*Dendroica coronata*	Yellow-rumped Warbler		Winter	
99	*Dendroica townsendi*	Townsend's Warbler		Winter	
100	*Geothlypis trichas*	Common Yellowthroat		Year-round	Yes
101	*Icteria virens*	Yellow-breasted Chat	CSC	(Summer)	
102	*Pipilo maculatus*	Spotted Towhee		Year-round	Yes
103	*Pipilo crissalis*	California Towhee		Year-round	Yes
104	*Aimophila ruficeps*	Rufous-crowned Sparrow	CSC, RR	Year-round	Yes
105	*Chondestes grammacus*	Lark Sparrow	RR?	Year-round	
106	*Passerella iliaca*	Fox Sparrow		Winter	
107	*Melospiza melodia*	Song Sparrow		Year-round	Yes
108	*Melospiza lincolnii*	Lincoln's Sparrow		Winter	
109	*Zonotrichia atricapilla*	Golden-crowned Sparrow		Winter	
110	*Zonotrichia leucophrys*	White-crowned Sparrow		Winter	
111	*Junco hyemalis*	Dark-eyed Junco		Year-round	Yes
112	*Pheucticus melanocephalus*	Black-headed Grosbeak		Summer	Yes
113	*Guiraca caerulea*	Blue Grosbeak	RR?	Summer	
114	*Agelaius phoeniceus*	Red-winged Blackbird		Year-round	Yes
115	*Sturnella neglecta*	Western Meadowlark	RR?	Winter	
116	*Euphagus cyanocephalus*	Brewer's Blackbird		Year-round	Yes
117	*Molothrus ater*	Brown-headed Cowbird		Year-round	Yes
118	*Icterus cucullatus*	Hooded Oriole		Summer	Yes
119	*Icterus bullockii*	Bullock's Oriole		Summer	Yes
120	*Carpodacus purpureus*	Purple Finch	RR	Year-round	
121	*Carpodacus mexicanus*	House Finch		Year-round	Yes
122	*Carduelis psaltria*	Lesser Goldfinch		Year-round	Yes
123	*Carduelis tristis*	American Goldfinch		Year-round	
124	*Passer domesticus**	House Sparrow*		Year-round	Yes
	RR = Rare Resident (see Section 5 of text)				
	CSC = Calif. Bird Species of Special Concern (see Section 5 of text)				
	* Introduced, non-native species				

Appendix III. Threats to Griffith Park Natural Areas.

	Threats						
Site	Vegetation trampling	Wildlife feeding (active)	Wildlife scavenging	Off-leash dogs	Cement/ debris	Invasive plant infestation	**TOTAL THREATS**
Mt. Lee (park portion)				X			1
Brush Canyon	X		X	X	X	X	5
Western Canyon	X		X	X	X	X	5
Vermont Canyon(s)					X	X	2
Aberdeen Canyon						X	1
Coolidge Canyon						X	1
Fern Canyon	X					X	2
Crystal Springs Area		X	X		X	X	4
Spring Canyon					X	X	2
"Camp Rd." Canyon (unnamed)						X	1
Skyline Trail				X		X	2
Oak Canyon					X		1
Mt. Hollywood/peaks				X			0
Royce Canyon							0
Los Angeles River				X	X	X	3
Toyon Canyon Landfill						X	1