GRIFFITH PARK WILDLIFE MANAGEMENT PLAN

(FINAL)

January 22, 2009

Monterey ensatina *Ensatina eschsholtzi*, photographed in Brush Canyon in August 2008 (D.S. Cooper)

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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. It is also home to large and significant populations of wildlife, including several species of plants and animals otherwise extinct from most of the Los Angeles Basin. Despite its considerable biological value, virtually no wildlife surveys had been conducted here prior to 2007, when a fire swept through 800 acres in the southeastern corner 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, if implemented by the Dept. of Recreation and Parks, will help ensure future co-existence of 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:

Most effective/Lowest cost

- Identify a small number of dog-free trails or zones in the most biologically-significant areas, and have rangers enforce the leash law here.
- Refrain from removing dead trees and fallen wood in wildland/natural areas, except where this poses an imminent safety hazard.
- Avoid clearing native vegetation of any kind except where absolutely necessary for flood control (e.g., debris basins) and public safety, and restrict clearing to as small an area as possible.
- Limit planting new plant material and landscaping in wildland areas away from culturally-significant gardens, except as part of professional habitat restoration effort.
- Allow for "passive restoration" of streams and culverts by reducing use of herbicide/brush clearance (to focus on non-natives), directing native plantings, and removing invasive and non-native species. Note: this does not call for an elimination of herbicide use in the park.
- Avoid new light- and noise-creating features in wildland areas of park.
- Store garbage away from wildland areas (e.g., move out of upper Ferndell/Western Cyn.).
- Have rangers target major coyote feeding zone (vic. ranger headquarters) by ticketing violators.
- Rotate temporary closures of sections of trails in canyon and other sensitive areas to allow for recovery of local ecosystem (e.g., close 1-2 years each).

Low cost/Highly-effective

- Replace open-top garbage cans with closed-top ones, and replace broken dumpsters.
- Retire selected trails (especially unauthorized footpaths) causing damage to sensitive habitat areas using boulders, brush clippings (native only), etc.; develop and post informative signs to educate park staff and users to changes.
- Post signage about animal crossing along roads near culverts, stream crossings, and other areas of high usage (see website). Work with LAPD to enforce the speed limit in these areas.

Continuing current activity

- Work with local biologists (or hire one on staff) to ensure that "special-status species" (protected by state and/or federal law) are not adversely affected by park activities.
- Support research on wildlife status, including sensitive species presence/absence, biological hotspots, wildlife movement corridors and choke-points, impacts of human activity (incl. off-leash dogs).
- Remove invasive non-native plants, particularly in burn area where soil is most vulnerable to invasion.

- 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.
- Discourage new trails and roads to be established in the park, preserving intact habitat blocks.

Long-term projects to consider
This plan seeks to set a course for conservation practices in the park for many years, and to this end, we want to identify some ambitious projects that would require considerable planning and capital, but which would greatly enhance and preserve the current biological diversity of the park.

- Restoration demonstration

We recommend identifying a small number of sites to serve as "demonstration areas" for restoration and management, such as the Fern Canyon natural trail area, lower Brush Canyon, and upper Ferndell. All three are high-visibility sites with high biological value, and are currently highly-impacted by human use, non-native species, and other factors. We suggest erecting split-rail/"wood-crete" fencing around the most sensitive habitat areas, such as streams and native oak groves, taking care not to impair the natural aesthetics of the sites. Portions of streams could be restored by removing cement where not needed, including artificial channels and non-functional check-dams. We suggest using qualified, professional firms with native habitat restoration experience in southern California, and to not rely on volunteer labor or "work days".

- Wildland eucalyptus/pine removal

Park-wide, we recommend initiating an effort to start to remove non-native, planted trees such as eucalyptus and pines from natural areas where they are not contributing to shade and wildlife habitat, and where they are impacting sensitive natural communities such as coastal sage scrub; obviously, this would not include established, culturally-significant gardens (e.g., Dante's View, Amir's Garden).

Other non-natural features that could be removed concurrently include abandoned furniture and camping equipment (from homeless encampments) and the miles of unused irrigation pipe literally covering the entire eastern half of the park; this should be eventually removed, since modern fire-fighting systems don't need them, and they contribute to soil degradation and invasion by non-native species.

- Natural Areas Program

Finally, we suggest the establishment of a "natural areas program" or similar entity within the Dept. of Recreation and Parks. This program would be modeled after similar programs in other park agencies, such as San Francisco's Natural Areas Program, and would be charged with coordinating professional and volunteer restoration and research in the parks, and monitoring native vegetation and wildlife. The staff of this program would work at many

levels within the City (including park rangers, Urban Forestry, Engineering, park maintenance, etc.), and interact closely with colleagues in other agencies and groups working on similar issues, including the Mountains Recreation and Conservation Authority/Santa Monica Mountains Conservancy, California State Parks, and Los Angeles County nature center staff.

Funding sources
To accomplish the more ambitious goals discussed here, we recommend the establishment of a conservation fund for the park, jointly overseen by a board of Department of Recreation and Parks staff and park advocates, charged with raising and disbursing money for park improvements. Models elsewhere include New York's Central Park Conservancy, and San Francisco's Natural Areas Program. A portion of the fees collected in the park, especially from movie and television filming, special events, and other private activities could also be directed to this fund, which would in part mitigate any damage caused by such activity.

3. INTRODUCTION

3.1. *Justification for plan*

One of the best reasons to manage wildlife at Griffith Park is that it is the law - California state law provides for the protection of plants and animals believed to be rare and endangered at the statewide level, and the park is home to seventeen "special-status species". Some of these, such as the western whiptail (a lizard) *Cnemidophorus tigris stejnegeri (=Aspidoscelis tigris multiscutatus)* and the rufous-crowned sparrow *Aimophila ruficeps canescens*, are still fairly common in the park; others like the horned lizard *Phrynosoma coronatum blainvillii* are known mainly from historical specimens with only a smattering of recent sight records. Under state law, any activity that could threaten the survival of any of these protected species must have its effects minimized and mitigated for, through consultation with the California Dept. of Fish and Game (CDFG), the regulatory agency charged with protecting these species statewide. At the local level, any new development or land-use change that occurs in the park is also subject to review by the Los Angeles County Dept. of Regional Planning, as Griffith Park has been identified as a "Significant Ecological Area" (SEA #9) by the County's General Plan (currently being updated). Should any federally-protected species become established in Griffith Park (such as the California Gnatcatcher *Polioptila californica* or Least Bell's Vireo *Vireo bellii pusillus*), the U.S. Fish and Wildlife Service would also be required to review any land-use change in the park that could affect these species.

Because of its large size and its location in southwestern California, Griffith Park supports a high diversity of native species, particularly for an urban preserve. The park's geographical setting, the "California Floristic Province," was recently identified as 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); the presence of more than 4,000 acres of intact habitat within this biodiversity hotspot would thus obviously support a significant

flora and fauna. This plan represents the first attempt to assess the park's biodiversity and set a course for protecting it.

For many of its plant and animal species, Griffith Park, however vast, represents an island, cut off from the rest of the Santa Monica Mountains to the west, and from the Los Angeles River and the Verdugo Mountains to the north and east. As such, most of its biodiversity is essentially trapped, with the exception of birds and a few highly-mobile species. Many small mammals and amphibians, for example, will not disperse more than a few meters from their natal territories in a lifetime. In other ways, the park merges seamlessly with the surrounding residential areas along what is known as the urban-wildland interface, or the urban interface zone, with wildlife such as deer *Odocoileus hemionus* and coyote *Canis latrans* moving freely between backyards and undeveloped lots and the park. This presents its own set of issues, as the park's human neighbors must co-exist day-to-day with the region's wildlife.

The park also has a history of heavy usage by people, who over the years have brought their own vision of nature to the park, planting hundreds of acres of non-native trees, cutting trails through sensitive habitat, and building houses up to the park's borders. Larger forces also affected the park; the Los Angeles River was transformed from a natural system into a concrete-lined flood-control channel by the 1940s, leaving linear fragments of remnant habitat where the water table was too high; a massive landfill (Toyon Canyon) claimed a major canyon in center of the park during the 1950s, and much of the flat land of the park was converted to golf courses and irrigated picnic areas.

This history of use has come at a great cost to many species of plants and animals. Based on recent surveys, several dozen plants and animals for which we have museum specimen records are believed to be now extinct in the park. These include fragile wildflowers like the Brewer's redmaids *Calandrinia breweri*, as well as charismatic birds like the golden eagle *Aquila chrysaetos*, which used to nest in the park during the early 1900s. Many other species are known from tiny, discrete areas of the park, and may "blink out" without our attention and action. Each local extinction, or extirpation, degrades a bit of the park's – and the earth's – biodiversity, and it is the duty of park management and the concerned public to ensure that these species have a fighting chance to survive.

3.2 *Audience*

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. It examines Griffith Park's natural communities and establishes best practices for managing wildlife within the park. This plan synthesizes known biological information from the vicinity of the park, identifies threats that degrade wildlife habitat, and recommends actions to retain the considerable biological diversity still present 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 wellbeing of Griffith

Park's biodiversity. Along with an accompanying website (www.griffithparkwildlife.org), this plan may serve as a dynamic, up-to-date source of environmental information readily available to staff and the general public, and as a tool 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 plan 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.

3.3 *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 4,667 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.

As the park grew, so did Los Angeles; since the 1950s, but increasing greatly since the 1980s, local neighborhood organizations have successfully limited new construction within the park in an effort to keep it as wild as possible; a 2004 draft master 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.

During the latter half of the 20th Century, the park's natural landscape also changed considerably. Whereas photos from the early 1900s (on display at the park's visitor center) show arid hills covered with sparse vegetation and open, sandy patches, today's vegetation is much more dense, with decades-old chaparral cloaking most of the park. Tree-planting through the 1900s transformed large areas of the park into an "urban forest" of non-native eucalyptus and pine, which were irrigated via a network of metal pipes that now cover most of the eastern half of the park. Fortunately, historical collections of plant and animal species housed in local museums, dating from the late 1800s, provide insight into the historical natural setting of the park. These suggest a landscape rich in native wildflowers, now scarce or locally extinct and unable to compete with non-native grasses and weeds, as well as an woodland environment which sustained a diverse amphibian population, now highly-degraded.

3.4 *Setting*

Griffith Park is located within Los Angeles city limits at the eastern end of the Santa Monica Mountain range. Elevations within the park range from just over 300' along the Los Angeles River to more than 1600' along the highest ridges, rising most steeply on the park's north face. 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 35 mi. 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 (see www.griffithparkwildlife.org for additional maps).

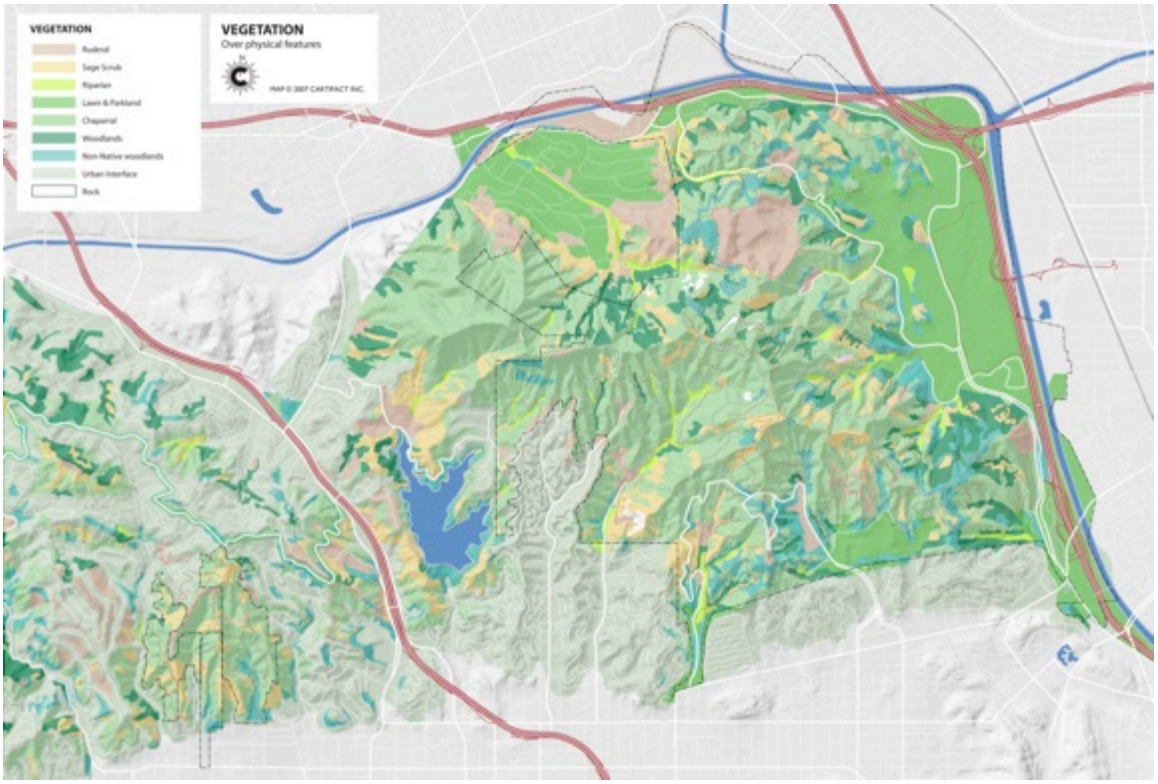

Figure 1. Map showing the vegetation of the eastern Santa Monica Mtns., including Griffith Park (dashed line).

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 *Felis rufus*. 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 (the 2004 Master Plan included a handful of bird observations, but otherwise no other plant/animal data; early plant lists were not peer-reviewed, and were not based on specimens or photographs so cannot be verified). Preliminary studies of certain wildlife species distribution and habitat use were initiated in early 2007 (by Cooper Ecological Monitoring, Inc.) to provide baseline data on wildlife in the park, and to guide this management plan. Of course, 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.

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 wilderness identity"
4. "Manage the park trails to prevent undesirable impacts on native vegetation, wildlife habitat and hillsides"
5. "Acquire additional open space"
6. "Create, restore and maintain wildlife corridors"

This plan recommends four primary *wildlife management* goals:

- Promote protection and, only where necessary, enhancement of native wildlife populations and habitat.
- Facilitate the collection of wildlife distribution and ecological information.
- Minimize conflict between humans and wildlife throughout park and in surrounding urban areas.
- Promote basic ecological education among park staff (as part of training) and park users (through signage and programs).

This management plan broadly addresses 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 also elucidates relevant California law and Los Angeles Municipal Code provisions that benefit wildlife (Appendix I).

4. HABITAT DESCRIPTIONS

This section describes the major vegetation communities that comprise the different wildlife habitats in Griffith Park. We also discuss the status of certain rare habitat types present in the park that are protected and monitoring by state agencies (Holland 1986, DFG 2003) (codes follow those used in DFG 2003/CNDDB), which include:

<u>Riversidean Alluvial Fan Sage Scrub</u> 32.005.02 (relicts at lower elevations along Forest Lawn Dr.)
<u>California Encelia Scrub</u> 32.050.00 (small patches throughout, esp. Royce and Brush cyns.)
<u>Coast Prickly Pear Succulent Scrub</u> 32.150.00 (small patches throughout)
<u>Chamise - Black Sage – Mixed Shrub</u> 37.102.03 (dominant habitat, esp. higher elevations)

Purple Needlegrass (grassland) 41.150.00 (small patches in Brush/Western canyons; probably elsewhere?)
Southern Willow Scrub 61.208.00/Southern Riparian Scrub 63.900.00 (along Los Angeles River channel; vic. Mineral Wells/ "Boys Camp" canyon; locally around debris basins throughout park)
California Sycamore (woodland) 61.310.00 (dominant vegetation in larger canyons)
Southern Coast Live Oak Riparian Forest 71.060.20 (larger canyons, e.g., Brush, Vermont, Western, Coolidge, Fern, Spring, "Boys Camp", Oak and Royce)
Southern California Black Walnut Woodland 72.100.01 [forms a solid woodland at Coolidge Canyon; co-dominant (with oaks) along north face (Mt. Hollywood Rd.); and in lower Brush Canyon]

Because Griffith Park's vegetation has not been intensively surveyed, the actual extent of these communities is not well understood. However, all the above-mentioned communities should be considered present in the park, and future disturbance to any of these should be carefully analyzed.

We describe "best management practices" for each habitat type, specific activities that would reduce current threats and improve the health and ecological function of these natural communities. 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 (Fig. 2a). Many of these have become "attractive nuisances" which detract from the natural setting of the park, the larger ones surrounded by trampled vegetation (or bare dirt) and covered with graffiti. Other actions could involve improved fencing (Fig. 2b) around sensitive habitats in the park (stream beds, wildflower concentrations) and even rotating temporary closures of the most fragile habitat areas to allow the natural communities to recover from years of chronic disturbance and degradation.

Figure 2a. The convergence of several habitat threats within oak woodland along Western Canyon (upper Ferndell); unused water pipe alongside illicit trail, encouraging trampling and root damage). Photographed Feb. 2008 by Daniel S. Cooper.

Figure 2b. Example of solid, naturalistic (wooden) fencing between a walnut woodland restoration area and road at Debs Park (Highland Park, Los Angeles). Photographed Jan. 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 *Ceanothus* spp., Toyon *Heteromeles arbutifolia* (the "hollyberry" for which "Hollywood" is named) and sumacs are common, with scattered oaks and walnuts providing limited vertical structure. This vegetation is so widespread in southern California that it scarcely draws notice except in fall and winter when it burns in what are often catastrophic brush fires. California chaparral shares many plant and animal species with coastal sage scrub and oak woodland habitat, with these three vegetation types forming a matrix the region's hills and valleys. Several types of chaparral exist in the park in discrete patches, including an Eastwood manzanita *Actostaphylos glandulosa* – dominated community along a high ridge between Mt. Hollywood and Mt. Bell, and dense, chamise *Adenostoma fasciculata* – dominated chaparral along the park's western border (north of Hollywood Reservoir).

Ecological value: Characteristic wildlife species of chaparral (including that within Griffith Park) include the dusky-footed woodrat *Neotoma fusciceps*, 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 *Pipilo crissalis*, the California thrasher *Toxostoma redivivum*, and the wrentit *Chamea fasciculata*. Though no wildlife species appears to be specifically dependent on this vegetation type alone (i.e., most will also occur in coastal sage scrub and/or woodland), it is possible that some of the more remote tracts on higher peaks (e.g. vic. Mt. Lee) still support scarce species like Costa's hummingbird *Calypte costae* and coast horned lizard. Several rare plants are also present locally in chaparral (as well as in coastal sage scrub) around the park, such as Plummer's mariposa-lily *Calochortus plummerae*.

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, such as from over-aggressive brush-clearance/trail maintenance, illicit footpaths and other activity, etc. Representative examples of rarer chaparral varieties (e.g., chamise chaparral, manzanita chaparral) should be identified and protected throughout the park where they occur naturally, and must be protected 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 (including sages *Salvia* spp., buckwheats *Eriogonum* spp., California sunflower *Encelia californica* and California sagebrush *Artemisia californica*) 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, the best examples of coastal sage scrub may be found 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, to around the Hollywood Reservoir into Cahuenga Pass. Succulents, including spiky yucca *Yucca whipplei* and native cactus of two species, the coast prickly-pear *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 sage scrub community (CNDDB, n/d), persists as a highly-degraded community on sandy soils along the river channel vic. Forest Lawn Dr. (incl. the "Headworks" site) and locally along the northern edge of the park and adjacent undeveloped slopes to the west. Characteristic plants of this community include Palmer's goldenbush *Ericameria palmeri*, the sunflower *Senecio flaccidus*, hooked navarretia *Navarretia hamata*, and yerba santa *Eriodyction crassifolium*.

Another priority native community, Valley Needlegrass Grassland (CNDDB, n/d), occurs in very small patches within coastal sage scrub, characterized by bunchgrass *Nassella* spp. and often supporting rare wildflowers such as lilies (incl. Catalina Mariposa-lily *Calochortus catalinae* and Chocolate lily *Fritillaria biflora*). It develops where soil moisture is sufficient to support grasses and forbs, but where soil disturbance has been low enough that invasive mustards and other plants do not occur. The only significant examples of this community appear to be along the ridge separating Brush and Western canyons, including within a large grassy opening on the east side of Brush Canyon about ½-way down the slope, and adjacent to the "One Mile Tree" along Western Canyon Rd. Others may occur in the park and await discovery.

Ecological value: Insect and reptile species diversity in the eastern Santa Monica Mountains is probably highest in coastal sage scrub, with coastal western whiptail (lizard), rufous-crowned sparrow, numerous scarce wildflowers (including Plummer's Mariposa-lily *Calochortus plummerae*) and several butterflies essentially confined to this vegetation in the park. Grassland fragments preserve the only remnants of a now-vanished natural community of native grasses and forbs (notably Catalina mariposa-lily), and are among the most significant natural

elements in Griffith Park. 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 *Uta stansburiana*.

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 the most degraded areas of the park, and relevant Griffith Park staff should remain abreast of the latest techniques for success by attending local natural history conferences and subscribing to relevant journals.
Several general recommendations – only to be used where little or no native flora remains - 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-dominated woodland along most streams in Griffith Park is considered another priority natural community (*Ibid*), Southern Coast Live Oak Riparian Forest (see also "Sycamore Woodland" below). Several picnic areas in the park have been placed in 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 its rich food and shelter resources (CalPIF 2002). Large trees provide the most acorns for food and sapling recruitment, are preferentially selected for nesting by raptors, and they provide the most shelter in the form of cavities., and They also produce the largest snags and other wildlife habitat (Tietje et al. 1997a,*b*; 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 *Sciurus griseus* and acorn woodpeckers. Other characteristic oak woodland residents include birds like the acorn woodpecker *Melanerpes formicivora*, oak titmouse *Baeolophus inornatus*, ringneck snake *Diadophis punctatus* and several scarce salamanders.

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, the best examples of this habitat type occur along Brush Canyon, Fern Canyon (recently burned), and Royce Canyon, and also in drainages surrounding the Hollywood Reservoir. In several areas (notably Western Canyon, Spring Canyon and Oak Canyon), the streambeds through sycamore woodland have been disturbed by the creation of cement "drop structures", debris basins, and other flood-control features. Still other areas (incl. Mineral Wells and lower Spring/Fern canyons) the streams have been transformed into cement culverts, with all the ground and shrub-level riparian vegetation removed (except perhaps scattered large sycamores).

Ecological value: The sycamore (incl. oak-sycamore) woodland along most streams in Griffith Park is considered a priority community by DFG (2003; either South Coast Live Oak Riparian Forest or pure Sycamore Woodland). Geupel et al. (1997, as cited in RHJV 2004) found that bird diversity in a California riparian woodland – including sycamore 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 *Urocyon cinereoargenteus*, bobcat and mule deer are probably most common along these canyons, which also support amphibians like Pacific chorus-frog *Pseudacris regilla* and songbirds like the Pacific-slope flycatcher *Empidonax difficilis*. Nesting bird species diversity is probably nowhere higher in the park than along its sycamore-lined streams.

Best Management Practices: Griffith Park's sycamore woodlands should be managed to promote structural diversity and understory integrity (RHJV 2004), which is currently being degraded in most canyons by human and dog trampling. Both spread non-native grass and shrub species, which crowd-out the rich diversity of native riparian understory species. 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) and golf courses, an effort should be made to identify potential restoration areas within these manicured areas, perhaps by allowing for some natural regeneration along culverts or at edges of picnic areas, where appropriate. Cement flood-control features should be re-evaluated for their effectiveness, and removed if found to not be contributing meaningfully to flood protection of park features. Clearing of debris basins should be done outside the nesting season (March – July) and with minimal use of heavy equipment so as to not disturb surrounding vegetation.

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, the north slope of Mt. Bell, Brush Canyon (including the man-made Bronson Caves), and in the Mineral Wells area near the Boy Scout Camp. Fern-like spikemoss *Selaginella* sp. forms succulent mats that dry outside the rainy season, filling in the soil patches between the rocks, and forming a substrate for a high diversity of wildflowers.

Ecological value: These outcrops are little-studied, though preliminary data indicate that they are important for denning mammals, including bobcat, and for roosting bats of several species. The odd canyon wren *Catherpes mexicanus*, a rock specialist, has recently been discovered at Bee Rock, and has also been see using the outcrops on the northwest side of Mt. Hollywood, and some reptile species, including the rarely-seen night snake *Hypsiglena torquata* (not known but possibly present in the park), are closely associated with loose slabs of rock. Finally, mats composed of mosses, lichens, ferns support some of the only populations of several wildflowers in the park, including peninsular onion *Allium peninsulare*, blue larkspur *Delphinium parryi* and Cleveland's shooting-star *Dodecatheon clevelandii*.

Best Management Practices: Rocky areas of the park should be further investigated for rare flora, as well as for their use as denning, nesting, or roosting sites by mammals and birds. 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, and access to sensitive sites would have to then be restricted accordingly.

4.1.6 Ruderal

Description: This designation 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 *Falco sparverius*, and a wide variety of sparrows and finches forage on grass seeds here in fall and winter. Mammals such as the California ground-squirrel *Spermophilus beecheyi* and Botta's pocket-gopher *Thomomys bottae* occur in abundance, providing a food base for a variety of birds, reptiles (including Pacific rattlesnake *Crotalus viridis* and gopher snake *Pituophis melanoleucus*) 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 be 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 remain

and 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 resident band-tailed pigeon (see Appendix II for Latin names), Cassin's kingbird and western bluebird, 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). 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); for example, the creation of a gradient of plant succession, or establishment of native hedgerows (e.g., mulefat, willows) or strips of native grasses (unmowed) along the boundaries of watered lawns 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, such as those in Western Canyon.

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: Though non-native, these plantations do provided limited habitat for native wildlife in the park. In winter, montane bird species like mountain chickadee and golden-crowned kinglet occur in the conifers, and migrant songbirds feed at flowering eucalyptus, silk-oaks *Grevillea robsuta* and other non-native trees. However, in areas where they were planted atop native vegetation (generally coastal sage scrub), they change the structure of the habitat by shading sun-requiring plants like cactus and wildflowers. The needles, leaves and bark that fall from these trees forms a thick layer of duff which also inhibits regeneration of native plants. They also convert what was a low-profile, open landscape to a woodland, which favors tree-dwelling wildlife species (e.g.,

western fence-lizard *Sceloporus occidentalis*, eastern fox-squirrel *Sciurus niger*) over the scrubland wildlife (e.g., side-blotched lizard, desert woodrat *Neotoma lepida*), which have become increasingly rare in the central Los Angeles Basin as the "urban forests" in residential areas matures and vacant lots disappear.

Best Management Practices: To restore conditions suitable for scrubland species highly-dependent on Griffith Park (and unable to thrive in residential areas of Los Angeles), these non-native trees and shrubs should be eliminated from the park where feasible, 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. We suggest removing trees from interior of the park first, selecting 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. Soon after, 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: "Southern Willow Scrub" is the dominant natural habitat along the Los Angeles River through Griffith Park, a vegetation type considered rare by the Calif. Dept. of Fish and Game (CNDDB, n/d). Here, special-status riparian/wetland species like yellow warbler *Dendroica petechia* and two-striped garter-snake *Thamnophis hammondi* are found in the riparian zones, while the cement channel floor supports flocks of dozens of migrant and wintering shorebirds, especially the black-bellied plover (see Appendix II for Latin names), least sandpiper and 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 connections 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 may support wetland species of local interest. We also presume the reservoir may be used by foraging bats of several species, at least seasonally. Finally, the lands just west of Lake Hollywood around Cahuenga Pass provide the only open space linkage between Griffith Park and the remainder of the Santa Monica Mountains, and deserve attention and research to assess wildlife usage of what may be an important dispersal corridor in and out of the park.

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 of 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 *Procyon lotor* and skunk *Mephites mephites* (Hoffman and Gottschang 1977, Broadfoot et al. 2001), and at least in the hills of southern California, for coyote. Previous research has shown secretive, often nocturnal species to use 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 plant 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, simply having large numbers of birds is different from supporting a high diversity of species, or species of conservation concern; 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 have documented a greater than 50% overall loss of species richness for wildlife taxa in urban cores when compared to surrounding rural areas (e.g., Denys and Schmidt 1998, Blair 2001, McKinney 2002). 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 with lawns, backyard fountains, and swimming pools providing year-round water, and pet food and garbage cans providing 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 *Mus musculus*), 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 hawk *Buteo jamaicensis* and great horned owl *Bubo virginianus*. 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 *Elgaria multicarinata* are widespread here, as is at least one amphibian, the Pacific chorus-frog.

5. SPECIES INFORMATION

Our knowledge of plant and animal species present in Griffith Park continues to grow as postfire bio-monitoring progresses (see Appendix II).

Birds are the best-known group, and 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. 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.

Around five species of amphibians and 10 reptiles are known from the park, and while mammals are too poorly-sampled at this point to assess diversity now, more than 20 species have been confirmed here. With the exception of one brief survey on butterflies (Bruyea 2003), we are not aware of any research conducted on invertebrate wildlife in Griffith Park. Bruyea (*Ibid*) recorded 16 butterfly species on two days in June 2003, but concluded that unseasonably cool conditions prior to the study may have affected the findings.

The flora of Griffith Park has only recently been investigated, with a preliminary list provided in Appendix IV. A species list of species by a former Griffith Park ranger (Bill Eckert) was updated in 2003 (R. Brusha, unpubl. data) but unfortunately it made no distinction between planted and wild species, and provided no herbarium record numbers or photographic evidence for the species therein. Still, this provided an important starting point, and since late 2007, a small team of local botanists and naturalists (D.S. Cooper, R. Fisher, G. Hans, J. Ochoa) have been working to confirm the species in the "original" list with photographs and specimens, and have investigated holdings from the park in all California herbaria.

We have selected a group of "target species" using a number of criteria, including their protected status within California, the effect they are thought to exert on the ecosystem, their historical decline in the region, 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. We further identify two broad categories for the target species, which should assist in management:

1. Special-status species: Those listed as threatened or endangered by either the state or federal government and known from the park, either historically or currently. Impacts to these species must be evaluated for any potentially-disruptive activity in the park, including new development, special events, etc., in consultation with the appropriate regulatory agency (generally the California Dept. of Fish and Game), and these impacts must be mitigated for. For a complete list and discussion, see: http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/SPAnimals.pdf

2. Stewardship species: These are species for which monitoring and management is recommended, and include the following categories:
   - Environmental Indicators: 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.

   - 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.

   - 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.

   - Rare Residents: Species found within the park and *not* in surrounding urban areas; these significantly add to the biodiversity of Griffith Park. For plants, these would include taxa listed by the California Native Plant Society as rare and in need of conservation attention (though not protected by current endangered species acts), as well as species deemed by local botanists to be especially rare and threatened in the Santa Monica Mountains (C. Wishner, in litt.). See: http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi

5.1 *Special-status species*

The following species are known from specimens, photographs, or positive recent sightings. A few are known only from specimen records, while others are fairly common in the park and can be observed readily in their preferred habitat at the proper season.

5.1.1 Coast Horned Lizard (*Phrynosoma coronatum blainvillii*)

Protection status: California Species of Special Concern

Ecology and distribution: This lizard occurs almost exclusively in sandy or gravel soils into which it can burrow to avoid predation, within a variety of habitats, including scrub, open woodland, and riparian zones, (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 (extinct throughout most of Los Angeles Basin). Snakes and raptors are among its known natural predators, but domestic cats and dogs probably take a toll near urban areas. This species is highly sensitive to habitat disturbance, and invasive Argentine ants *Linepithema humile* promoted by residential development and irrigation are a serious threat as they displace harvester ants, its primary food source (Stebbins 2003, Fisher et al. 2002). Horned lizard growth rate is negatively affected by a diet of Argentine ants (Suarez et al. 2000, Suarez and Case 2002). Once (pre-1970) common in the San Fernando Valley and Los Angeles Basin, its status in Griffith Park needs to be determined; it is probably extinct locally, though scattered recent reports by hikers and maintenance workers suggest it may persist around sandy roadways and other barren areas, at least at higher elevations in the interior of the park.

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

Protection status: California Species of Special Concern

Ecology and distribution: One of the aquatic garter snakes of California, this species is associated with riparian habitat and 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. 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* continues to reduce habitat quality for it throughout its range. 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 (Appendix I). It may persist in (or wash downstream into) suitable habitat the length of the river channel, and may possibly even occur in larger canyons such as Royce and Brush canyons.

5.1.3 Coastal whiptail (*Cnemidophorus tigris stejnegeri*)

Protection status: California Species of Special Concern

Ecology and distribution: 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. Sensitive to habitat loss and urban disturbance, Hass et al. (2002) expresses concerns about mortality along roadways and dirt paths where bikers are present. 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, as well on high peaks and ridges within the park (e.g., Mt. Chapel). They often co-occur with several scarce scrubland wildlife species, including the Rufous-crowned Sparrow and buckwheat-dependent butterfly species.

5.1.4 Silvery Legless-lizard (*Anniella pulchra pulchra*)

Protection status: California Species of Special Concern

Ecology and distribution: 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 feed on insect larvae, insects, and spiders. These small lizards are threatened by discing (for weed-abatement), invasive plants, and urbanization, as well as outright habitat loss; trampling and mortality from other human activities are also a concern (Stebbins 2003). This animal is not known to currently occur in the park (the last known specimen is from 1965), but recent reports from local residents (to DSC) suggest it may persist 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. Confirmation of its presence is desirable.

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

Protection status: California Species of Special Concern

Ecology and distribution: This small, slender snake 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 its 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*), but this snake is highly secretive, spending most of its life underground, and may not suffer high mortality other than by the occasional road kill. Since the collection of the last known specimen (1959), this snake has been confirmed still occur park, with individuals found at Spring Canyon (30 May 2008), Western Canyon (road-killed in May, *per* G. Hans) and Oak Canyon in June 2008 (2 juveniles, ph. DSC), though its abundance is not known. 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).

5.1.6 San Diego Mountain Kingsnake (*Lampropeltis zonata* ssp.)

Protection status: California Species of Special Concern

Ecology and distribution: This snake occurs in rocky areas of foothills and mountains, often along streams, and while a population persists in the western Santa Monica Mtns., it is known from just a single historical specimen (from "Griffith Park" in 1942; UAZ 25136). In addition, one individual was found recently in the L.A. Zoo parking lot (*per* I. Recchio), which leaves some doubt as to its provenance. Confirmation of current presence in the park is highly desirable.

5.1.7 Coast patch-nosed snake (*Salvadora hexalepis*)

Protection status: California Species of Special Concern

Ecology and distribution: This small snake is confined to arid areas with loose, often sandy soil, a condition increasingly rare in the Los Angeles area. It is active during the day and preys on lizards, but otherwise, little is known about its ecology. This snake is known from Griffith Park from two historical specimens (SDNHM 38901, 43194; latest in 1955). The locations of these collections are not known, and therefore it is impossible to gauge the current status of this species.

5.1.8 Cooper's Hawk (*Accipiter cooperi*)

Protection status: California "Watch List" Species

Ecology and distribution: This medium-sized raptor is a common year-round resident in the Los Angeles region, and builds a large stick nest in tall, dense-foliaged trees, often along canyon bottoms and in older residential areas. In recent years (since 1990s) its numbers have increased dramatically in the area, and it now nests in fairly urban sites where it is the only nesting raptor (e.g. vic. Park La Brea, DSC). Cooper's Hawks feed almost exclusively on birds, which it catches in flight. Birds in our area nest from late winter through mid-summer (March – July), and are extremely territorial around nest sites, calling loudly and often "dive-bombing" people who come within 20 meters or so of a nest. In Griffith Park, this hawk may be most common in the residential neighborhoods surrounding the park, but it also makes heavy use of the park's canyons. During spring/summer surveys in 2008, birds were found in Vermont Canyon (active nest in Bird Sanctuary), Brush Canyon, Western Canyon (Ferndell), Fern Canyon (2 on 22 May), and Spring Canyon. Winter surveys (Oct/Dec. 2007) detected birds near Aberdeen Canyon (vic. Tennis Courts on 07 Oct.), Oak Canyon (both Oct. and Jan.) and the north fork of Spring Canyon, suggesting that some local movement may occur between breeding and wintering areas.

5.1.9 Loggerhead Shrike (*Lanius ludovicianus*)

Protection status: California Species of Special Concern

Ecology and status: This raptor-like songbird was once very common in the Los Angeles area (including in Griffith Park, K.L. Garrett, unpubl. data), but is know virtually extirpated. Recent sightings in the park have come from the Vermont Canyon area (drainage behind the tennis courts) during fall 2007 (DSC) and from the north face of Mt. Chapel (March 2008, DSC), but in both cases, birds were not seen after the initial sighting and were apparently transients. Confirmation of a regular wintering or nesting area is desirable.

5.1.10 Yellow Warbler (*Dendroica petechia*)

Protection status: California Species of Special Concern

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 is closely tied to native vegetation, and since it requires the presence of a lush understory of native shrubs (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, and several pairs presumably breed in willows here (see Appendix II). 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.

5.1.11 "Southern California" Rufous-crowned Sparrow (*Aimophila ruficeps canescens*)

Protection status: California "Watch list" species

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.

5.1.12 San Diego desert woodrat (*Neotoma lepida intermedia*)

Protection status: California Species of Special Concern

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

5.1.13 Western mastiff bat (*Eumops perotis californicus*)
Western red bat (*Lasiurus blossevillii*)

Protection status: California Species of Special Concern (both)

Ecology and distribution: Both bats are poorly-known in the Los Angeles area, though at least the western red bat has recently (Remington, in prep) been documented as occurring at Griffith Park. A tree-roosting, migratory bat, the red bat may use the many wooded canyons within the park, at least during migration. The mastiff bat is associated with arid to semi-arid environments, found in areas with significant rock features - particularly exfoliating rock slabs (e.g., granite, sandstone, or columnar basalt; see Pierson 1998, as cited in Stephenson and Calcarone 1999) which support colonial cliff-roosting (Remington 2006,

CNDDB n/d). Highly nocturnal, the mastiff bat appears to be a fast-flying moth specialist (*Ibid*), and though this species, like many bats, has experienced significant population declines in southern California, it has been documented recently, albeit at low densities, in the nearby Puente Hills, an ecologically similar area (Remington 2006). Given its roost habitat preferences, it should be searched for at rock outcrops on the slopes above Royce Canyon, among other places. Griffith Park bat surveys (which began only in 2008) should elucidate the status of this and other bat species in the park.

5.1.14 Nevin's barberry (*Berberis nevinii*)

Protection status: Federally Endangered/State Endangered (wild populations)

Ecology: This spiny shrub is one of the rarest plants in the U.S., and is protected under both the Federal and State Endangered Species Acts. Though currently known from just a handful of locations in interior southwestern California, the origin of the plants at Griffith Park is murky, but they are almost certainly derived from planted individuals, possibly from local (now extirpated) populations in the east San Fernando Valley. This plant produces a profusion of yellow flowers in late winter, and is then covered with fleshy berries that ripen black. These berries are consumed by many bird species, which probably accounts for the modest spread of the species around the park.

Threats: Though all known populations were spared in the last fire (May 2007), this species could easily be severely impacted by future fires. Otherwise, it appears to be resistant to non-native species such as grasses and mustards and is therefore probably fairly secure in the park.

Local Distribution/Status in Griffith Park: Two main populations are known, one in an arc just downslope of the Griffith Observatory; the other on the north side of Vista del Valle Rd. between Mt. Bell and Bee Rock. Scattered plants may also be found near the tennis courts in Vermont Cyn., and near the Brush Cyn. trailhead, both along chainlink fences bordering the road (suggesting transport by birds).

5.1.16 Southern California black walnut (*Juglans californica* var. *californica*)

Protection status: CNPS "Rare"

Ecology: This common (in our area) decidous tree is found on clay soils throughout the lower hills of the Los Angeles Basin, where it reaches its peak abundance in the Puente Hills and eastern Santa Monica Mountains. Plants are frequent in the mid-canopy of oak woodland, as co-dominants in scrub with sumacs and toyon, and locally forming a solid woodland comprised almost entirely of walnuts (as at Coolidge Canyon in the southeastern corner of the park). Walnuts produce small fruit which are food for many animals, and their fallen bark provides habitat for amphibians year-round.

Threats: Though possessing a fairly small global range, black walnuts are a particularly hardy plant, vigorously re-sprouting after a fire (as happened following the 2007 fire in Griffith Park).

5.1.17 Catalina mariposa-lily (*Calochortus catalinae*)

Protection status: CNPS "Rare"

Ecology: This delicate lily is confined to moist, heavy clay soils, where its pale pink flower may be seen in spring growing through the non-native grasses. It has a very small global range, being confined to lowland southern California and the Channel Islands below about 2000' elevation, and is a good indicator of undisturbed clay soils. The California Native Plant Society codes this species 4.2 – "plants of limited distribution" and "fairly threatened" (see: www.cnps.org).

Threats: Frequent fires and disturbance such as "disking" (ploughing firebreaks with heavy machinery) apparently eliminates this species, which is now largely absent from habitat fragments in and around Los Angeles (e.g., Debs Park, D.S. Cooper, unpubl. data).

Local Distribution/Status in Griffith Park: This rare annual is known from two sites at Griffith Park, the largest (several hundred plants) being within a grassy opening within chaparral on the eastern slope of lower Brush Canyon (found by G. Hans in 2008). Several other locally-scarce species co-occur here, including the Fremont star-lily *Zigadenus fremontii* and baby blue-eyes *Nemophila menzesii*. A smaller population (<50 plants) occurs on a north-facing slope near the park boundary along the west side of Western Canyon (adj. to "The Oaks" neighborhood of Los Feliz). This latter patch of habitat is notable for supporting an intact community of wildflowers, including such uncommon species as chocolate lily (*Fritillaria biflora*) and Danny's skullcap (*Scutellaria tuberosa*) (pers. obs.).

5.1.18 Plummer's mariposa-lily (*Calochortus plummerae*)
Slender mariposa-lily (*Calochortus clavatus* var. *gracilis*)

Protection status: CNPS "Rare" (both species)

Ecology: Both lilies are confined to coastal-slope southern California, and occur on rocky and gravel soils below about 4000' elevation, often within coastal sage scrub and chaparral. The California Native Plant Society codes both these species 1B.2 – "rare, threatened or endangered in California or elsewhere" (see: www.cnps.org).

Threats: Both species are still locally common in the Santa Monica and San Gabriel Mountains where their habitat remains intact; however, at least *C. plummerae* has certainly experienced major losses at lower elevations in the Los Angeles area due to development, particularly in the eastern Santa Monica Mtns. Brush-clearing and trampling also take a toll locally, as does too-frequent fire, which turns wildflower habitat into weedy, ruderal slopes dominated by non-native plants.

Local Distribution/Status in Griffith Park: Though a historical collection of *C. plummerae* was made in the 1960s at Griffith Park (RSA29033), the plant was apparently not seen again until 2008, when several small populations were located here, mainly on higher ridges. Most of the individuals of *C. plummerae* occur on the steep ridge that extends up from near the Sunset Stables (Beachwood Canyon) to Mt. Chapel, east to Mt. Bell and Mt. Hollywood, with additional groups of plants found near Glendale Peak/upper Fern Cyn., and near the Royce Cyn. overlook. Plants are generally encountered off-trail or on small footpaths, suggesting that weed-abatement along roadsides may be impacting this delicate species. *C. clavatus* is much rarer, and was found in just one location, the north face of Mt. Chapel, near the peak, which may represent one of the only known locations in the eastern Santa Monica Mtns.

5.1.19 Humboldt lily (*Lilium humboldtii* var. *occelatum*)

Protection status: CNPS "Rare"

Ecology: This large, striking orange lily is restricted to shady, moist canyons in southwestern California that retain high humidity during the hot summer and fall months, and is probably a good indicator of an intact foothill riparian system. The California Native Plant Society codes this species as 4.2 – "plants of limited distribution" and "fairly threatened" (see: www.cnps.org). Human disturbance, including trampling by people and dogs, and picking wildflowers, may represent the greatest threats to this species in the park. It can apparently withstand some fire, as several were emerging in Fern Canyon the winter following the May 2007 (J. Ochoa, ph.). This species is known from just three sites, Brush Canyon (upper portion of canyon has the largest population with dozens of individuals in 2008, pers. obs.), Spring Canyon, and Fern Canyon, with the total population in the park probably somewhat fewer than 100 individuals.

A handful of additional sensitive species known from the park appear to be extirpated, or at least have not been found in several decades despite searching in appropriate habitat. These include the Golden Eagle *Aquila chrysaetos,* which formerly bred (see Appendix II) and two state Species of Special Concern that likely occurred along the Los Angeles River through the park prior to its being lined with cement, the Western pond-turtle *Eumys marmorata* and the Yellow-breasted Chat *Icteria virens*. Both are now scarce in the Los Angeles area, and their future occurrence at Griffith Park seems unlikely.

Three rare plants (per CNPS) are known from historical records in the park, but have not been seen during recent fieldwork in 2007-2008:

Dudleya multicaulis Many-stemmed dudleya (CNPS 1B.2) (coll. 27 Apr. 1924 at "Foothills N, between Vermont and Western Ave. – Los Angeles"; RSA 397814).

Calandrinia breweri Brewer's red maids (CNPS 4.2) (coll. 20 Mar. 1928 at "Vermont Canyon, Los Angeles, Griffith Park"; JEPS 17234).

Horkelia cuneata ssp. *puberula* Mesa (aka Wedgeleaf) horkelia (CNPS 1B.1) (CNDDB; coll. 1918 at "Griffith Park" and 1895 at "Cahuenga Pass").

Given the amount of development at Vermont Canyon since the 1920s (e.g., construction of the Griffith Observatory, planting of hundreds of trees on slopes between Vermont and Western Canyons), it is likely the *Dudleya* and the *Calandrinia* are now extirpated from this locale. However, similar open scrub habitat as likely occurred here in the 1920s is still extant in places like Mt. Hollywood to the north and on the ridge between Brush and Western canyons, which may harbor either species. The *Horkelia* is a plant typical of gravelly soil and alluvial fans, and it could be rediscovered in the arid scrub along the border of Forest Lawn Cemetery, or in a debris basin along Forest Lawn Dr. A recent (30 May 2008) search of a small debris basin just northwest of the park's boundary revealed several uncommon alluvial scrub plant species, including hooked navarretia *Navarettia hamata*, and further fieldwork could reveal its presence.

5.2 "*Stewardship Species*"

These are species which are not formally protected by law, but which should still be of concern to land managers at Griffith Park because of their local rarity, a current threat to their continued existence, or because of their unique role in the ecosystem. **Important note: this list below is far from exhaustive; additional scarce species are being found in the park almost monthly.** Rather, it provdies but a small sampling of the exceptional biological diversity and importance of the far eastern Santa Monica Mountains, an area which had been largely overlooked by field biologists until this study. Hopefully these and others will be treated in future publications.

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

Reason for being a target: Environmental Indicator, Umbrella Species, Rare Resident

Ecology and distribution: 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 include loss of habitat from urbanization, invasive weeds displacing larval hostplant (Martino et al. 2005). This butterfly is found locally from central California south to central Baja (Opler et al. 2006), and was documented in Griffith Park in spring 2003 (Bruyea 2003). Several were observed in spring 2007 and 2008 on slopes of Mt. Lee above Deronda Dr. (D.S. Cooper, pers. obs.).

5.2.2 Harvester Ants (*Pogonomyrmex* spp. and *Messor* spp.)

Reason for being a target: Keystone species

Ecology and distribution: 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*). 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). 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 they can follow anthropogenic disturbance such as roads deeper into habitat reserves. Though these ants have not been studied in the park, they are apparently widespread, particularly along fire roads through chaparral at higher elevations (D.S. Cooper, pers. obs.).

5.2.3 Arboreal Salamander (*Aneides lugubris*)

Reasons for being target: Umbrella Species, Rare Resident

Ecology and distribution: 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). 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, so their presence may be linked to healthy, undisturbed oak trees. Though many amphibians are extremely susceptible to environmental pollution, the persistence of the arboreal salamander here and 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. Until 2008, the last specimen record in Griffith Park had been from 1951; however, a single juvenile was found by Daniel S. Cooper along Spring Canyon in late Nov., 2008, following a particularly intense rain event. Another large salamander with similar habitat requirements, the Monterey ensatina *Ensatina eschscholtzii*, was rediscovered in the park in 2008 (along Brush Canyon; D.S. Cooper).

5.2.4 California Quail (*Callipepla californica*)

Reasons for being target: Environmental Indicator, Umbrella Species, Rare Resident

Ecology and distribution: 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). Quail are known to be highly sensitive to local extinctions in urban southern California, and are unlikely to recolonize areas once extirpated (Crooks et al. 2001). 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. Quail are found throughout the park, but appear to be most common along the western edge of the park, particularly around the Hollywood Reservoir and at Royce Canyon (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 Monicas.

5.2.5 Oak Titmouse (*Baeolophus inornatus*)

Reasons for being target: Environmental Indicator, Umbrella Species

Ecology and distribution: 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 most sedentary birds, and are therefore especially vulnerable to local extinction and are probably incapable of colonization across unsuitable habitat. 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 declining species, based on trends in summer and winter bird surveys. 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.

5.2.6 Wrentit (*Chamaea fasciculata*)

Reasons for being target: Environmental Indicator, Umbrella Species

Ecology and distribution: 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 dependent 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. 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 in areas of native chaparral and scrub, and the development of new picnic areas and other built features in otherwise undeveloped places in the park would be expected to negatively impact this species, as it cannot utilize non-native vegetation, particularly non-native trees. Currently, the Wrentit is common and widespread in the park, away from built areas, except within the recent burn area (probably temporary). 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%.

5.2.7 Canyon Wren (*Catherpes mexicanus*)

Reasons for being target: Rare Resident

Ecology and distribution: 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). 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 Mountains, but this is probably because there is so much of this habitat there; in Griffith Park, suitable habitat may be restricted to the area around Bee Rock and other large rock outcrops in the park. Any increase in recreation on and around Bee Rock could negatively affect this species. The population size of the Canyon Wren in the park is tiny, limited to at most two pairs of birds around Bee Rock and upper Brush Canyon; 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.

5.2.8 Western gray squirrel (*Sciurus griseus anthonyi*)

Reason for being target: Environmental Indicator

Ecology and distribution: 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). 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). 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.

5.2.9 Mule deer (*Odocoileus hemionus californica*)

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

Ecology and distribution: 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 in 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*). 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). 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.

5.2.10 Bobcat (*Lynx rufus*)

Reason for being target: Environmental Indicator, Rare Resident

Ecology and distribution: 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). Habitat disturbance and fragmentation; females are particularly sensitive (Riley et al. 2003). Vehicular collisions are a significant cause of mortality in urbanized areas (*Ibid*). 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. An adult as killed along Crystal Springs Dr. south of the park headquarters in 2008 (A. Torres, ph.). The installation of signage and enforcement of the speed limit in the park would reduce mortality and injury to this animal and many others.

5.2.11 Valley cholla (*Cylindropuntia californica* var. *parkeri*) Note: formerly "*Opuntia parryi*"

Reasons for being target: Environmental Indicator, Rare Resident

Ecology and distribution: This distinctive cactus is a characteristic member of the alluvial fan scrub community of interior southwestern California, along with dry-soil plants such as scalebroom *Lepidospartum squamatum* and yerba santa *Eriodictyon crassifolium*. Apparently unknown elsewhere in the Santa Monica Mountains, these plants may have been "stranded" on the lower slopes of Griffith Park after the near-complete elimination of this community in the eastern San Fernando Valley. Most populations are co-occurring with the more widespread (native) cactus *Opuntia littoralis*. Planted eucalyptus are currently impacting several small populations within the park, providing shade and leaf litter on a plant that favors open, arid conditions. A fire between Travel Town and Spring Canyon could seriously impact this species in the park. Plants are scattered in small clumps (c. 10 known; <100 plants?) on the low hills between Oak Canyon and Spring Canyon, essentially the entire northeastern quadrant of

the park. The species likely occurred at the site of the zoo and the Wilson Harding Golf Course prior to development.

5.2.12 Eastwood manzanita (*Arctostaphylos glandulosa* ssp. *mollis*)

Reasons for being target: Environmental Indicator, Rare Resident

Ecology and distribution: This elegant shrub is a clear relict of a cooler, wetter climate in the eastern Santa Monica Mountains, and is now essentially "stranded" on the slopes of Mt. Hollywood, disjunct from other populations in the western Santa Monica Mountains and showing some distinctive physical characteristics (B. O'Brien, pers. comm.). This manzanita grows on well-drained, eroding sandstone soils with other chaparral shrubs (incl. chamise *Adenostoma fasciculatum*), and does not colonize burned or disturbed areas quickly. Fire may be the single gravest threat to this manzanita, but careless brush-clearing and tree-planting could also impact its tiny range in the park. The May 2007 fire in the park impacted about half the known occurrences of this plant (the Dante's View group; see below), and many of the burned individuals do not appear to be re-sprouting and are presumed dead. Perhaps fewer than 50 individual plants survive in two nearby areas: the western slopes of Mt. Hollywood between "Captain's Roost" and Mt. Hollywood Rd., and a steep ridge that extends east from "Dante's View" toward Bee Rock (R. Fisher, pers. comm.).

5.2.13 Bush interior live oak (*Quercus wislizenii* var. *frutescens*)

Reasons for being target: Environmental Indicator, Rare Resident

Ecology and distribution: Another relict of cooler climate, a small grove of this shrubby tree was located within the 2007 burn area on the upper slopes of the unnamed canyon behind the Vermont Canyon tennis courts in spring 2008 (D.S. Cooper, *fide* A.S. Sanders, UC Riverside). This may be the only occurrence of this scarce oak in the eastern Santa Monica Mtns. (McAuley 1996), where it occurs as an isolated occurrence from larger populations in the northern San Gabriel Mountains. These plants suffered minor damage in the May 2007 fire but have survived.

5.2.14 Chocolate lily (*Fritillaria biflora*)

Reasons for being target: Environmental Indicator, Umbrella Species, Rare Resident

Ecology and distribution: Co-occurring with Catalina mariposa-lily in the park (in clay lens along Western Canyon Dr.; see above), this delicate spring wildflower is now rare in the Los Angeles area (*fide* R. Fisher), the victim of too-frequent fire and competition with non-native weeds. It is restricted to heavy clay soils within coastal sage scrub and chaparral which retain summer moisture, often in areas which support a high diversity of other scarce wildflowers (and therefore may be thought of as an "umbrella species". Since fewer than 50 individuals are known from only a single small location along a busy road in the park, it appears to be especially vulnerable.

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. 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. The following sections are organized around four main goals for wildlife management.

6.1 *Promote native wildlife populations and habitat.*

6.1.1 Protect native species and biological "hotspots"

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 (see McKinney 2002). Non-native species have many deleterious effects on local ecology, which often work in concert to degrade ecosystems. Unfortunately, these relationships are poorly-understood by the general public.

For example, planted eucalyptus trees…

- Displace native shrubs and trees and simplify otherwise complex ecosystems (e.g., a small number of eucalyptus species planted within a super-diverse coastal sage scrub community).
- Drop oil-rich twigs, bark and fruit, which inhibits regeneration of other plants.
- Burn readily during brushfires, and "wick" flames and embers high in the air, allowing them to spread more quickly.
- Change the structure of habitat, favoring common, tree-dwelling species (like fence-lizards) over scarce, scrub-dwelling ones (like whiptail lizards).
- Attract pest species like (non-native) European honeybees, which compete with our uniquely-evolved native bees, leading to decreased pollination of native wildflowers, loss of butterfly species, etc.
- Attract non-native eastern fox squirrels, an urban-adapted species which competes with our native western gray squirrel for resources.
- Fewer western gray squirrels mean fewer acorns cashed in the fall, which means less regeneration and expansion of oak groves.

Planted pine trees…

- Drop pine needles, which fall to the ground and form a mat of duff, which inhibits the regeneration of native plants.
- Require irrigation, which attracts (non-native) Argentine ants, and…

- Argentine ants out-compete native harvester ants, depriving scarce native reptiles of a major food source.
- Argentine ants form large colonies and prey on bird eggs and nestlings of ground nesting birds like the California Quail.
- The irrigation lines attract weeds like sticky eupatory *Ageratina adenophora*, which invade streambeds, and…
- Crowd out wet ground along streams used by salamanders for foraging.

Lists and maps of non-native plant species in the park are being developed (R. Fisher, City of Los Angeles), and restoration projects involving the removal of the most aggressive and invasive species should be a top 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.

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 un-mown, particularly in the fall when producing seed, promoting use by birds, pollinating insects, and small mammals. Examples would be leaving an un-mowed 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. We know that Royce Canyon supports numerous plant species not found elsewhere in the park (e.g., *Allium peninsulare*), as do Mt. Chapel and Mt. Hollywood. Rare and important systems like wetlands and riparian woodland in various canyons and along the Los Angeles River, essentially all of it potential habitat for special-status species, should be defended and enhanced through restoration efforts. So too should particularly robust examples of major vegetation types (e.g., oak woodland, coastal sage scrub), and rare vegetation types such as manzanita-dominated chaparral. Key animal breeding sites, including raptor nests and bobcat denning areas 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 Monica Mountains for over four decades, it is very possible that only limited wildlife movement west into the central and western Santa Monicas 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 on protecting improving existing habitat within 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.

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 for wildlife 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.), and may be considered a high priority for research and conservation attention.

Because the park is surrounded by urbanization, certain built features at the edge of the park have resulted in "Missing Links", or barriers to the dispersal of mammals, and could also be modified to reduce mortality and human-wildlife conflict. Examples would include places where culverts and drainages run directly from the park/open space into busy roadways (e.g., along Forest Lawn Dr.), or where they collide into residential neighborhoods where the animals using them are left vulnerable to edge effects and other conflicts (e.g., lower Brush Canyon, lower Vermont Canyon). Speed humps, reflective "turtles" and/or signage at these critical points, as well as enforcement of speeders by the Los Angeles Police Department, would probably reduce road kill in the park. The plan website (www.griffithparkwildlife.org) provides a map of potential chokepoints and missing links, but more research is needed to identify the most heavily-traveled (by wildlife) locations, since there may be additional sites where road kill is prevalent that do not conform to drainages and known movement corridors.

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 degradation are contained and limited. Urgently needed are appropriate fencing around sensitive areas, 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 re-contouring 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. Table 1 provides a summary of threats to major areas of the park, organized into subregions.

Table 1. Threats to subregions of Griffith Park.

	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	X	3
Aberdeen Canyon						X	1
Coolidge Canyon				X		X	2
Fern Canyon	X	X				X	3
Crystal Springs Area		X	X		X	X	4
Spring Canyon					X	X	2
"Camp Rd." Canyon (vic. Boys camp)						X	1
Skyline Trail				X		X	2
Oak Canyon					X	X	2
Mt. Hollywood/peaks				X			1
Royce Canyon							0
Los Angeles River				X	X	X	3

Sites in obvious 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 un-enforced. Currently, the streambed 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, including sticky eupatory *Ageratina*

adenophora, nasturtium *Tropaeolum* sp., periwinkle *Vinca major*, and perennial grasses (several species).

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. Large areas of the understory vegetation is now dominated by non-native weeds and has a network of small footpaths winding through it, typically lined with litter. Upstream of this, the upper Western Canyon (mainstem) has been largely denuded of native vegetation, and illicit trails have resulted in a lack of clear direction on where to hike. Also in this area are several old cement checkdams along the stream that have become silted in and are no longer functional, yet the riparian vegetation (incl. mulefat *Baccharis salicifolia* and willows *Salix* spp.) is regularly removed here by heavy machinery, resulting in a major weed infestation (esp. castor bean *Ricinis communis* and mustards). The city leash law is totally un-enforced here, as it is throughout the park, but the large number of dog-walkers along the trails to the observatory is rivaled only by that of Brush Canyon (Mathewson et al., unpubl. data). Numerous non-native trees, including eucalyptus and silk-oak *Grevillea robusta*, clog the stream bed, stealing resources from the native sycamores, California bays *Umbellularia californica* 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. 6, below).

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 in surprisingly good 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 castor bean and mustards. 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 several cars present every day offering a variety of human food to a pack of coyotes (Fig. 5, below), despite

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 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 ecosystem 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. Dog-walking, including dog-walking services which bring multiple (off-leash) dogs onto the trails, has increased in recent months. Fencing, either split-rail or "wood-crete", might also help in abating this, since even though the canyon is rarely-visited by park users and there is full access to the creek, leaving it vulnerable to trampling, additional weed invasion, and other threats.

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.

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 historical and ongoing reforestation efforts, the northeastern corner of Griffith Park was most 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 each year their habitat becomes small and more degraded. Removing all of the thousands of trees might be cost-prohibitive and politically difficult, yet key areas should be identified for aggressive restoration, which would include cutting and chipping all eucalyptus wood, and using the chips for bio-fuel. Many companies will offer a reduced rate on

tree-cutting in order to keep the chips for this use. Since the hills just west of the L.A. Zoo (vic. Skyline Trail) may support the best-quality sage scrub in the eastern half of the park (with several special-status and stewardship species), work could begin there.

6.1.3.9 Toyon Canyon

For over 30 years, this 100-acre 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. So, while the current ruderal habitat is not native, it could supports many scarce native species with few habitat options in the region.

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. Several groups (including Friends of the Los Angeles River and Northeast Trees) have been working to restore lands alongside the Los Angeles River for years, and continued cooperation between these groups and management agencies should improve conditions for wildlife here.

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

Figure 4. Trampled coastal sage scrub, lower Brush Canyon (girls camp in background). Bright green vegetation in foreground is a non-native mustard that has invaded following soil disturbance. Photographed Feb. 2008 by Daniel S. Cooper

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

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

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

The South Coast region of California is home to 158 special-status vertebrate species (Bunn et al. 2006). From recent baseline studies we know that over a dozen special-status species have been recorded in the park (see section 5.1 above, and Appendix II). Many of 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 Maintain a species inventory

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 ecological 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 management topics that can be incorporated into research projects for local graduate students and university faculty, and the park headquarters should archive copies of all reports resulting from research in the park, in order to make these readily available to the public.

6.3 *Minimize human-wildlife conflict*

This section deals with a range of issues involving the interaction between human activity and wildlife. As Griffith Park is heavily used by people, and is surrounded by residential areas, its managers must constantly balance the needs of humans vs. those of wildlife, for both legal and aesthetic reasons.

6.3.1 Consult with regulatory agencies

The best reason to minimize impacts to wildlife is that it is the law. Two agencies, California Dept. of Fish and Game (DFG) and the U.S. Fish and Wildlife Service, oversee the protection of the state's wildlife and plant species, and work with developers and land managers to minimize impacts to special-status species. Since Griffith Park does not protect any federally-listed species, DFG would have jurisdiction over projects that would potentially impact state-listed species, including Species of Special Concern (see section 5.1). Therefore, any project in the park that could impact these species, many of which are widespread in the park, would require consultation with DFG (for example, the hydro-mulching project following the May 2007 required surveys of all affected areas prior to the application of hydro-mulch). Other projects that could require consultation with DFG include excavation of debris basins, road and trail construction, and any new development in the park. Other agencies that might require consultation include the U.S. Army Corps of Engineers and the Environmental Protection Agency for any changes to streams and other waterways.

6.3.2 Strengthen law enforcement

Law enforcement in Griffith Park is currently shared by both the Park Rangers and the Los Angeles Police Dept. (General Services). The Los Angeles Municipal Code lists 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 populated zones and often along rugged trails, special training and equipment (e.g., mountain bikes, horses) may be necessary for the law enforcement needed within the park.

6.3.2.1 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, and scent marking; transmission of disease

through defecation. 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 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 appropriately, 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, developed 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.

6.3.2.2 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 engage in daytime public sex/prostitution, drug use, and smoking. The outdoor activity peaks in the afternoon during the warmer months (Mar. - Nov.), and is 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 massive May 2007 burn - have apparently 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).

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.

6.3.2.3 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 (Fig. 5). 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 that staff and citizen groups pursue 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, while avoidance is developed through negative interactions, and habituation through neither positive nor negative interaction, with wildlife simply becoming accustomed

to a neutral 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 given 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 abundant and adaptable, and the removal of one will only result in the replacement by another individual. Reduction of the attraction – be it garbage, pet food, outdoor pets, water, etc. – 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.

6.3.4 Manage recreation to avoid conflicts with wildlife

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).

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 large picnic areas and points of public interest, is known, usage of areas 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 and depend on these habitats, we strongly suggest initiating a regular trail-user survey to quantify trail use and better identify human-wildlife conflict areas, which may change through the years.

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 (see Fig. 7a,b). 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).

Figure 7a. Example of signage from Central Park, New York. Note simplicity and use of non-threatening language. Photographed Sept. 2008 by Daniel S. Cooper.

Figure 7b. Example of informative, attractive signage, Central Park, New York. Photographed Sept. 2008 by Daniel S. Cooper.

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.

6.3.5 Reduce passive wildlife feeding

Passive, or indirect wildlife feeding, (as opposed to deliberately giving food or water to animals) can be damaging on several fronts, depending on the type, location and timing of feeding. Garbage in the park attracts non-native species, including rats (*Rattus* spp.) and insects including Argentine ants, sow bugs (Isopoda), and earwings (Dermaptera) that degrade the natural balance of native species and ecosystem function by driving out the much wider variety of unique native species that depend on the park (as opposed to the city) for their survival. Thus, the appropriate habitat for natives is increasingly restricted to smaller and more remote areas.

Chronic garbage dumping, "cat colonies" (food left for feral cats; fortunately not a major problem at Griffith probably thanks to coyotes) and other types of concentrated feeding can result in un-naturally large numbers of native species (e.g., California ground-squirrel, coyote) as well, which can then become vectors for disease. In addition, native wildlife that becomes accustomed to anthropogenic feeding may begin to see humans as food sources, resulting in animals aggressively approaching people and 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).

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.

6.3.6 Restrict use of rodenticides near wildland habitat

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 undetected 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. Public-education efforts targeted at residents in the urban interface zone would address this issue, and several land-management agencies, notably California State Parks, produce brochures, DVDs, and other materials addressing living with wildlife.

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

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*).

Though enthusiasm for nature runs high among park staff and visitors, specific knowledge about the region's natural ecology, and how human recreation in the park may affects wildlife, is not as widespread. Informed, ecologically literate 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 area colleges and universities. Contact lists for experts on native wildlife should be maintained by Park Rangers and other staff, and the park itself should be used as a classroom where possible. The park is a particularly valuable outdoor classroom resource for urban 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 less direct education could also be explored, including weather- and vandal-resistant kiosks replaced regularly and erected at popular trailheads (at a distance from parking lots and roads to encourage 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 honestly assessed, and deficiencies addressed. All park employees should be given basic environmental education so this knowledge can be applied everyday park management, including 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 actual threats from wildlife

Los Angeles residents have a famously love-hate relationship with wildlife; they marvel at seeing red-tailed hawks soaring over the hills or a coyote walking down their street, yet clutch their pets close at the sight of that hawk overhead or coyote on their driveway. It is critical for park staff to understand and provide some perspective on the risk of *actual* threats from wildlife, rather than to scare people away from venturing outdoors with multiple

warnings about local plants and wildlife. 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 mundane accidents - are vanishingly few. Park visitors are far more likely to be injured or even killed *driving to* Griffith Park than hiking there. Despite a near-constant barrage 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 responsible hikers and park users, including coyotes, rattlesnakes, tarantulas, scorpions, or 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 to the park. It should be stressed that below is 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). Under moderate moisture and wind conditions fires will burn out or may be contained by firefighters (Keeley and Fotheringham 2001). However, severe conditions are simply not rare, and should be anticipated by land managers as an inevitability.

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.S. Cooper and R. Fisher, unpubl. data) are a testament to the resilience of the vegetation community here. However, the park is still surrounded by a massive urban landscape totally dominated by non-native, often invasive tree and plant species. Thus, park managers should make sure fire frequencies in the park do result in annual burns which don't allow native species to rebound, 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 do provide insight into how Griffith Park's wildlife likely react to fire.

7.3.1.1 Mammals

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 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 also obvious over large areas of the burn.

7.3.1.1 Reptiles/amphibians

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). I n 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 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 to 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.S. 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 disastrous 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 compatibility 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 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 an isolated reserve (which many habitats in the region are quickly becoming). 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.

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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)**).

"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	Post-2000	Mathewson et al. 2008	
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	Post-2000	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	Post-2000	Remington, in prep.; K. Dearborn, Los Angeles Zoo, via email, 2007	Also 1944 specimen from "Griffith Park Zoo" (LACM 10717)
7		*Lasiurus cinereus cinereus*	Hoary bat	Post-2000	Remington, in prep.	Also a 1928 specimen from "Hollywood" (LACM 9425)
8		*Lasiurus blossevillii*	Western red bat (CSC)	Post-2000	Remington, in prep.	
9		*Myotis californicus*	California myotis	N/A		Appears on SMM checklist
10		*Myotis yumanensis*	Yuma myotis	N/A		Appears on SMM checklist
11		*Pipistrellus hesperus*	Western pipistrelle	N/A	Remington, in prep	
12		*Eumops perotis californicus*	Western mastiff bat (CSC)	1991	LACM 94011	"Hollywood"
13		*Tadarida brasiliensis mexicana*	Mexican free-tailed bat	Post-2000	Remington, in prep.; K. Dearborn, Los Angeles Zoo, via email, 2007.	1990 specimen from "Los Angeles River; 1 km E Hwy 2" (LACM 91737)
14		*Procyon lotor psora*	Raccoon	Post-2000	Mathewson et al. 2008	
15		*Bassariscus astutus octavus*	Ringtail	1935	LACM 4297	"Los Angeles; Hollywood Hills"
16		*Mephitis mephitis holzneri*	Striped skunk	Post-2000	Mathewson et al. 2008	
17		*Spilogale putorius phenax*	Spotted skunk	1929	LACM 1203	"Los Angeles; Griffith Park"; also, two 1941 specimens from "Hollywood Dam".
18		*Mustela frenata latirostra*	Long-tailed Weasel	1941	LACM 8089	"Hollywood Hills"
19		*Canis latrans ochropus*	Coyote	Post-2000	Mathewson et al. 2008	
20		*Urocyon cinereoargenteus californicus*	Gray fox	2007	Mathewson et al. 2008	
21		*Vulpes vulpes fulva**	Red fox*	1969	LACM 52201	"North Hollywood; Universal City" (not established and presumably absent).

22		*Lynx rufus californicus*	Bobcat	Post-2000	Mathewson et al. 2008	
23		*Puma concolor*	Mountain Lion	N/A		No confirmed records
24		*Sciurus griseus anthonyi*	Western gray squirrel	Post-2000	DSC, pers. obs.	
25		*Sciurus niger**	Eastern fox squirrel*	Post-2000	DSC, pers. obs.	
26		*Spermophilus beecheyi beecheyi*	California ground-squirrel	Post-2000	DSC, pers. obs.	
27		*Thomomys bottae bottae*	Botta's pocket-gopher	Post-2000	DSC, pers. obs.	
28		*Chaetodipus californicus dispar*	California pocket mouse	Post-2000	Photographed Oct. 2008 (DSC)	Also LACM 20564 (1941)
29		*Microtus californicus*	California vole	Post-2000	LACM (specimen in prep.)	Brush Cyn.
30		*Neotoma fuscipes macrotis*	Dusky-footed woodrat	1997	LACM (multiple specimens)	Vista del Valle Dr.
31		*Neotoma lepida intermedia*	San Diego desert woodrat (CSC)	1997	LACM (multiple specimens)	Vista del Valle Dr.
32		*Peromyscus californicus insignis*	California mouse	1941	LACM (multiple specimens)	"Ferndell, Griffith Park"
33		*Peromyscus eremicus fraterculus*	Cactus mouse	1941	LACM (multiple specimens)	"Griffith Park"
34		*Peromyscus maniculatus*	Deer mouse	N/A		Appears on SMM checklist
35		*Reithrodontomys megalotis longicaudus*	Western harvest mouse	1941	LACM (multiple specimens)	"Ferndell, Griffith Park"
36		*Mus musculus**	House mouse*	1941	LACM 20582	"Griffith Park"
37		*Rattus norvegicus**	Norway rat*	N/A		Common throughout Los Angeles
38		*Rattus rattus**	Black rat*	N/A		Common throughout Los Angeles
39		*Sylvilagus audubonii sanctidiegi*	Desert cottontail	Post-2000	DSC, pers. obs.	
40		*Sylvilagus bachmani cinerascens*	Brush rabbit	1933	LACM 30780	"Los Angeles; Griffith Park"; recent unconfirmed sightings vic. "Hollywood" sign.
41		*Odocoileus hemionus californica*	Mule deer	Post-2000	Mathewson et al. 2008	
Amphibians (names follow Stebbins 2003)						
1		*Aneides lugubris*	Arboreal Salamander	Post-2000	Multiple specimens	Collected Nov. 2008 in Spring Cyn. (D.S. Cooper, to LACM).
2		*Batrachoseps nigriventris*	Black-bellied slender-salamander	Post-2000	DSC (ph.)	
3		*Batrachoseps major*	Garden slender-salamander	1941	LACM 731	"Griffith Park, Los Angeles"
4		*Ensatina eschscholtzii eschscholtzii*	Monterey Ensatina	Post-2000	DSC (ph.)	Brush Canyon, June 2008
5		*Taricha torosa*	Coast Range newt (CSC)	1946	MVZ 42425	"Hollywood Hills"; unk. to De Lisle et al. (1986) east of Coldwater Canyon.
6		*Bufo boreas*	Western toad	Post-2000	DSC (ph.)	
7		*Pseudacris regilla*	Pacific chorus-frog	Post-2000	DSC (ph.)	
8		*Rana catesbeiana**	Bullfrog*	1992	LACM 139920	"Los Angeles River, end of Newell St; ~1 km downstr. of Glendale Fwy".

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	Post-2000	DSC (ph.)	
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 blainvillii*	Coast horned lizard (CSC)	1919	MVZ 7863	"1 mi S Lankersheim"; at least one recent report from upper elevations of park (to DSC).
5		*Sceloporus occidentalis*	Western fence lizard	2007 Post-2000	DSC (ph.)	
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	Post-2000	DSC (ph.)	
8		*Cnemodophorus tigris stejnegeri*	Coastal whiptail (CSC)	Post-2000	DSC (ph.)	
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.).
10		*Crotalus viridis helleri*	Pacific rattlesnake	Post-2000	DSC (ph.)	
11		*Diadophis punctatus modestus*	San Bernardino ringneck snake (CSC)	Post-2000	LACM 2298	Various locs. (D.S. Cooper, unpubl. data).
12		*Hypsiglena torquata*	California night snake	N/A		Specimens from central Santa Monica Mtns.
13		*Lampropeltis getulus californiae*	California kingsnake	Post-2000	A. Torres (ph.)	
14		*Lampropeltis zonatus pulchra*	San Diego mountain kingsnake (CSC)	1942	UAZ 25136	"Griffith Park"; De Lisle et al. (1986) lists as occurring in Franklin and Coldwater Cyn. "extinct by 1975" or "not verified".
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".
16		*Masticophis lateralis lateralis*	Chaparral (California) whipsnake	Post-2000	DSC (ph.)	
17		*Pituophis melanoleucus annectens*	Pacific gopher snake	Post-2000	DSC, pers. obs.	
18		*Salvadora hexalepis virgultea*	Coast patch-nosed snake (CSC)	1955	SDMNH 43194	No recent records.

20		*Thamnophis hammondii*	Two-striped gartersnake (CSC)	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).
21		*Trimorphodon biscutatus lambda*	Western lyresnake	N/A		De Lisle et al. (1986) considered this species extirpated/not verified from Beverly Hills prior to 1975.

ANNOTATED CHECKLIST OF BIRDS OF GRIFFITH PARK

April 2007
Last updated Jan. 2009

Unlike other vertebrates, birds are particularly well-surveyed in the region, and numerous sources of data are available, particularly sightings of active local birders. The list below is an attempt to synthesize multiple data sources. An additional 40-50 species which have occurred as vagrants are not treated here, as they are not expected to become part of the park's avifauna in the near future.

[ ] = Los Angeles River portion only
* = breeding confirmed
*? = breeding suspected

Three-letter acronyms (e.g. BUR, HOL) are local atlas blocks based on USGS topographic maps used by the Los Angeles County Breeding Bird Survey. Roughly, they would cover the following areas:

HOL 2: southern portion of park, vic. Los Feliz.
BUR 5: northwestern corner of park, incl. Forest Lawn and Mt. Lee.
BUR 6: northeastern portion of park, incl. vegetated portion of L.A. River vic. Bette Davis Park.

Accounts for non-native species are in *italics*.

[Canada Goose *Branta canadensis*] Non-breeding (?) resident along vegetated portions of the Los Angeles River.
[Wood Duck *Aix sponsa*] Winter resident along vegetated portions of the Los Angeles River.
[Gadwall *Anas strepera*] Winter resident along vegetated portions of the Los Angeles River.
[American Wigeon *Anas americana*] Winter resident along vegetated portions of the Los Angeles River.
[*Mallard *Anas platyrhynchos*] Breeding resident, mainly along vegetated portions of the Los Angeles River. Ducklings noted vic. Los Feliz Blvd. on 10 May 2007 (DSC).
[Blue-winged Teal *Anas discors*] Winter resident along vegetated portions of the Los Angeles River.
[*Cinnamon Teal *Anas cyanoptera*] Breeding resident in small numbers along vegetated portions of the Los Angeles River. Nesting records include fledglings on 07 July 1995 and on 19 July 1999 (both LACBBA); copulating pair just north of Los Feliz Blvd. on 11 May 2007.
[Northern Shoveler *Anas clypeata*] Winter resident along vegetated portions of the Los Angeles River.
[Northern Pintail *Anas acuta*] Winter resident along vegetated portions of the Los Angeles River.

[Green-winged Teal *Anas crecca*] Winter resident along vegetated portions of the Los Angeles River.
[Bufflehead *Bucephala albeola*] Winter resident along vegetated portions of the Los Angeles River.
[Common Goldeneye *Bucephala clangula*] Winter resident along vegetated portions of the Los Angeles River.
[Hooded Merganser *Lophodytes cucullatus*] Winter resident along vegetated portions of the Los Angeles River.
[Ruddy Duck *Oxyura jamaicensis*] Winter resident along vegetated portions of the Los Angeles River.
[*?Pied-billed Grebe *Podilymbus podiceps*] Non-breeding (?) resident along vegetated portions of the Los Angeles River.
[Eared Grebe *Podiceps nigricollis*] Winter resident (Oct. - Mar.) along vegetated portions of the Los Angeles River.
[Double-crested Cormorant *Phalacrocorax penicillatus*] Non-breeding resident along vegetated portions of the Los Angeles River.
[Great Blue Heron *Ardea herodias*] Non-breeding resident along vegetated portions of the Los Angeles River.
[Great Egret *Ardea alba*] Non-breeding resident along vegetated portions of the Los Angeles River.
[Snowy Egret *Egretta thula*] Non-breeding resident along vegetated portions of the Los Angeles River.
[*?Green Heron *Butorides virescens*] Non-breeding (?) resident along vegetated portions of the Los Angeles River. One flushed out of a large willow along the river just north of Los Feliz Blvd. on 27 May 2007 (DSC).
[Black-crowned Night-Heron *Nycticorax nycticorax*] Non-breeding resident along vegetated portions of the Los Angeles River.
Turkey Vulture *Cathartes aura* Occasional visitor, esp. in late spring.
[Osprey *Pandion haliaetus*] Non-breeding visitor to Los Angeles River.
Sharp-shinned Hawk *Accipiter striatus* Scarce winter resident.
*Cooper's Hawk *Accipiter cooperii* Breeding resident. A nest was found with young on 04 June 1999 in HOL 2, and nesting was observed in several canyons during 2007 and 2008 (DSC). CWL
*Red-shouldered Hawk *Buteo lineatus* Localized breeding resident, mainly in sycamores around picnic areas along east side of park. Nesting records incl. an occupied nest on 31 May 1995 in HOL 2. Breeding pair at Bette Davis Park in spring 2007 (M. San Miguel); vocal pair vic. ranger headquarters, Mar. 2007 (DSC).
*Red-tailed Hawk *Buteo jamaicensis* Breeding resident. Nesting records incl. occupied nests on 04 May 1995 (HOL 2) and on 12 Apr. 1996 (BUR 5); several nests and begging juveniles noted during 2007/08.
American Kestrel *Falco sparverius* Scarce winter resident and transient, though a pair at Toyon Landfill 27 Apr. 2007 (MB) suggests possible nesting. Listed by Garrett (1970; undated) as an "uncommon permanent resident", but apparently no longer breeds in the park.
Merlin *Falcon columbarius* Uncommon winter resident. CWL
*California Quail *Callipepla californica* Breeding resident throughout park; absent from Los Angeles River. Nesting records include young on 12 June 1996 in BUR 5 and on 22 Sept. 1995 in southern portion of park; juveniles observed summer 2008 in Royce Cyn. DSC).
[Sora *Porzana carolina*] Transient and winter resident in patches of reeds, Los Angeles River.
[*American Coot *Fulica americana*] Breeding resident along vegetated portions of Los Angeles River. Nesting records include occupied nest on 12 May 1996 in BUR 6 Block (probably north of Los Feliz Blvd.).
[Common Moorhen *Gallinula chlorops*] Transient and winter resident in patches of reeds, Los Angeles River.
[Black-bellied Plover *Pluvialis squatarola*] Transient along cement section of Los Angeles River (vic. 134 Fwy.).
*Killdeer *Charadrius vociferus* Breeding resident, mainly along Los Angeles River; localized non-breeding visitor elsewhere, especially on large lawns and barren areas. Nesting records incl. fledglings/young on 12 and 30 May 1996 (BBA), and pairs with young in summers of 2007 (MSM) and 2008 (DSC).
[*Black-necked Stilt *Himantopus mexicanus*] Abundant breeding resident along Los Angeles River, mainly upstream of 134 Fwy. (c. 50 birds in spring 2007, MSM).
[Greater Yellowlegs *Tringa melanoleuca*] Transient (mainly fall) and winter resident along Los Angeles River.
[*Spotted Sandpiper *Actitis macularia*] Breeding resident, Los Angeles River; records include a nest on 19 July 1999 in BUR 6 Block of BBA.
[Western Sandpiper *Calidris mauri*] Transient and scarce winter resident along Los Angeles River, occasionally common (several hundred), esp. vic. 134 Fwy.
[Least Sandpiper *Calidris minutilla*] Transient and winter resident along Los Angeles River, occasionally common (several hundred), esp. vic. 134 Fwy.
[Wilson's Snipe *Gallinago gallinago*] Transient and winter resident along vegetated portions of Los Angeles River.
[Western Gull *Larus occidentalis*] Non-breeding visitor, mainly along Los Angeles River.
[California Gull *Larus californicus*] Transient and winter visitor, mainly on lawns or overhead.
[Ring-billed Gull *Larus delawarensis*] Transient and winter visitor, mainly on lawns or overhead.

[*?Rock Pigeon* Columba livia *Very common breeding resident in surrounding urban areas and along Los Angeles River; somewhat scarce within park itself.*]

*?Band-tailed Pigeon *Columba fasciata* Presumably breeding resident in planted conifers on perimeter of park (and adjacent residential area), at least since late 1950s (LACM files). Copulating pair observed on 19 Apr. 1996 in BUR 6.

*Mourning Dove *Zenaida macroura* Breeding resident, particularly in developed areas.

Yellow-chevroned Parakeet Brotogeris chiriri *Non-breeding visitor mainly observed flying overhead.*

*?Great Horned Owl *Bubo virginianus* Breeding resident; nest with young on 02 June 1995, and territorial pairs observed/heard on 05 Feb. 1996 and 02 July 1996 (BBA).

*?Western Screech-Owl *Megascops kenicottii* Apparently a rare resident, voice-recorded during bat surveys in 2008 at Spring and Royce Cyn. (S. Remington and G. Hans, to DSC). Several old specimens, incl. egg sets (2) from "Hollywood Mountains" (undated, WFVZ 89366, 89367).

*?Barn Owl *Tyto alba* Two historical egg collections (undated, WFVZ) from "Cahuenga" and "Cahuenga Pass"; probably resident in palms at edge of park.

*?Common Poorwill *Phalaenoptilus nuttallii* Listed as common in spring and summer vic. Brush Canyon by Garrett (1970; undated); recently (2008) heard and voice-recorded in Royce Cyn. during bat surveys in 2008 (G. Hans), so likely present in very small #s..

Vaux's Swift *Chaetura vauxi* Transient, spring and fall; winter resident along Los Angeles River. CSC

*White-throated Swift *Aeronautes saxatalis* Breeding resident. Nesting records include occupied nest on 19 July 1999 in BUR 6; probably breeds in all suitable rock outcrops and under freeway/river bridges throughout.

*Black-chinned Hummingbird *Archilochus alexandri* Common breeding visitor in picnic areas, along drainages and in residential edge, Apr. - Aug. Nesting records include nest-building (BUR 5) on 12 Apr. 1996.

*Anna's Hummingbird *Calypte anna* Common breeding resident. Nesting records include occupied nests on 23 Feb., 02 Mar. and 12 Mar. 1996 in all three BBA blocks.

Costa's Hummingbird *Calypte costae* Apparently a rare transient, with sightings of singles in April 2007 (to DSC) and Nov. 2008 (JF).

Rufous Hummingbird *Selasphorus rufus* Spring and fall transient, probably in variable numbers depending on flower availability.

*?Allen's Hummingbird *Selasphorus sasin* Status uncertain; numerous displaying pairs throughout the park in 2007 and 2008 (DSC), but no confirmed nesting records, historical or recent.

Calliope Hummingbird *Stellula calliope* Occasional and irregular transient around flowers, mainly in spring.

[Belted Kingfisher *Ceryle alcyon*] Winter resident and transient along vegetated portions of Los Angeles River.

*Acorn Woodpecker *Melanerpes formicivorus* Local breeding resident in canyons and picnic areas (but absent in Brush Canyon), especially where oaks mix with tall western sycamores. Nesting records include a nest with young on 12 May 1996 (BUR 6) and birds feeding young on 07 June 1995 (HOL 2).

Red-breasted Sapsucker *Sphyrapicus ruber* Scarce winter resident, typically in ornamental trees.

*Nuttall's Woodpecker *Picoides nuttallii* Common breeding resident throughout park. Nesting evidence include occupied nests on 30 Apr. 1995, 12 May 1996, and pair(s) on 12 June 1996 (all three atlas blocks).

*Downy Woodpecker *Picoides pubescens* Scarce breeding resident along Los Angeles River [family group at Bette Davis Park on 15 Apr. 2007 (MSM); copulating pair upstream of Los Feliz Blvd. 17 Feb. 1999, KLG]; non-breeding visitor elsewhere in park.

Northern Flicker *Colaptes auratus* Transient and winter resident; formerly (to mid-1990s?) a breeding resident. Nesting evidence include fledged young on 12 July 1995 (HOL 2), with singles or pairs encountered in two other blocks on 14/19 June 1996. Recent breeding-season records (e.g., one calling vic. Greek Theater on 08 May 2008 and at Aberdeen Cyn. on 05 June, both DSC), but no evidence of nesting.

Olive-sided Flycatcher *Contopus cooperi* Transient in small numbers, spring and fall; one old wintering record (c. 1980). CSC

Western Wood-pewee *Contopus sordidulus* Transient in spring and fall. Apparently a "common" former summer resident and presumed breeder in Brush Canyon (*fide* K.L Garrett) but now extirpated in this role; unrecorded in park during 1995-1999 Breeding Bird Atlas.

Willow Flycatcher *Empidonax traillii* Transient in late spring and early fall.

Hammond's Flycatcher *Empidonax hammondii* Transient, mainly in spring.

Dusky Flycatcher *Empidonax oberholseri* Transient, mainly in spring.

*Pacific-slope Flycatcher *Empidonax difficilis* Breeding visitor to shady canyons, Apr. - Aug. Nesting evidence includes a nest with young on 19 June 1996 (BUR 6), fledglings on 02 July 1996 (BUR 5) and birds feeding young on 01 July 1996 (HOL 2). Several pairs noted in all larger canyons in spring 2007 and 2008 (DSC).

*Black Phoebe *Sayornis nigricans* Common breeding resident. Nesting records (BBA) from all atlas blocks.

Say's Phoebe *Sayornis saya* Scarce visitor in open, especially unv-egetated areas. Recent summer records from Forest Lawn Cemetery, where it has bred (21 June 2002, LACM files; breeding confirmed in 2003, *fide* R. Barth).

*Ash-throated Flycatcher *Myiarchus cinerascens* Breeding visitor throughout park and along Los Angeles River (e.g., Bette Davis Park, *fide* MSM), Apr. - Aug. Nesting records include nest-building on 30 Apr. 1995 and territorial pairs on 19 June and 14 July 1996 (all three atlas blocks).

*?Cassin's Kingbird *Tyrannus vociferans* Probable breeding resident along northern and eastern edge of park; pairs at Forest Lawn on 16 May 2007 and along the Los Angeles River north of Los Feliz Blvd. on 27 May 2007; numerous through summer 2007/08 vic. Merry-Go-Round, and birds vic. Vermont Cyn. tennis courts 20 Apr. 2008 (all DSC).

*?Western Kingbird *Tyrannus verticalis* Transient and scarce presumed breeder (Mar. - Aug.). One nesting records, a pair with fledglings on 29 July 1996 (BUR 6).

Cassin's Vireo *Vireo cassinii* Transient, mainly spring.

*Hutton's Vireo *Vireo huttoni* Breeding resident in oak and sycamore woodland; pairs/singing birds in most canyons, and most numerous at Fern Dell/Western Canyon. Adult feeding fledglings in Brush Canyon 06 June 2007 (DSC).

Warbling Vireo *Vireo gilvus* Transient, spring and fall.

*Western Scrub-Jay *Aphelocoma californica* Common breeding resident throughout park.

*American Crow *Corvus brachyrhynchos* Common breeding resident along Los Angeles River and at urban edge, picnic areas.

*Common Raven *Corvus corax* Common breeding resident throughout park.

[Tree Swallow *Tachycineta bicolor*] Transient mainly along Los Angeles River.

Violet-green Swallow *Tachycineta thalassina* Transient (overhead), mainly in spring.

*Northern Rough-winged Swallow *Stelgidopteryx serripennis* Breeding visitor, Mar. - Aug. Nests widely, mainly in man-made cavities (bridges, drains).

[Bank Swallow *Riparia riparia*] Scarce transient along Los Angeles River.

*Cliff Swallow *Petrochelidon pyrrhonota* Breeding visitor, Mar. - Jul. Nests widely, mainly on man-made structures.

[*Barn Swallow *Hirundo rustica* Breeding visitor, Mar. - Aug. Nests widely in man-made situations (bridges, drains), near water.]

Mountain Chickadee *Poecile gambeli* Non-breeding visitor in (planted) conifers throughout park, mainly in winter, but probably summers in small numbers some years (e.g. 1 at Los Feliz Golf Course on 17 July 2007, DSC).

*Oak Titmouse *Parus inornatus* Breeding resident, mainly oaks and sycamores, including along Los Angeles River (e.g., Bette Davis Park, MSM).

*Bushtit *Psaltriparus minimus* Common breeding resident throughout.

Red-breasted Nuthatch *Sitta canadensis* Scarce winter resident in pines.

White-breasted Nuthatch *Sitta carolinensis* Fall transient and winter resident in woodland.

*Bewick's Wren *Thryomanes bewickii* Common breeding resident in throughout park.

*House Wren *Troglodytes aedon* Breeding resident around sycamores and other large trees with cavities.

[Marsh Wren *Cistothorus palustris*] Transient in reed beds along Los Angeles River.

Rock Wren *Salpinctes obsoletus* Rare fall transient visitor, one recent record (14 Oct. 2008 above Fern Cyn.); formerly considered a rare permanent resident in the park by Garrett (1970).

Canyon Wren *Catherpes mexicanus* Rare (breeding?) resident in rock outcrops, incl. Bee Rock.

Brown Creeper Certhia Americana Rare and irregular in late fall/winter (LACM files, LACoBirds, DSC).

Ruby-crowned Kinglet *Regulus calendula* Common winter resident throughout, particularly near trees.

Blue-gray Gnatcatcher *Polioptila caerulea* Transient in scrub and riparian habitats. Formerly bred (egg set collected from "Boy Scout Camp" in 1920, MVZ 4259).

*Western Bluebird *Sialia mexicana* Locally common breeding resident, almost exclusively at large sycamores with cavities, most of which are within picnic areas.

Swainson's Thrush *Catharus ustulatus* Uncommon transient. CSC

Hermit Thrush *Catharus guttatus* Common winter resident.

*American Robin *Turdus migratorius* Breeding resident around lawns and buildings; nesting recorded in all three BBA blocks.

*Wrentit *Chamaea fasciata* Common breeding resident; territorial pairs recorded from all three atlas blocks, and a family group of four was in Brush Cyn. 11 June 2008 (DSC).

*Northern Mockingbird *Mimus polyglottos* Breeding resident along Los Angeles River and on periphery of park.
*California Thrasher *Toxostoma redivivum* Breeding resident; nesting records include birds feeding young on 12 June 1996 (BUR 5).
**European Starling* Sturnus vulgaris *Common breeding resident, particularly near picnic areas and structures.*
Cedar Waxwing *Bombycilla cedrorum* Non-breeding visitor, present nearly yearround.
*Phainopepla *Phainopepla nitens* Breeding resident; nesting records include breeding at Bette Davis Park in spring 2007 (MSM) and nest-building on 25 Apr. and 10 May 1995 (BUR 5 and HOL 2, resp.).
*Orange-crowned Warbler *Vermivora celata* Common transient breeding visitor throughout; one observed carrying food to fledgling in Coolidge Cyn. on 05 June 2008 (DSC).
Nashville Warbler *Vermivora ruficapilla* Uncommon transient.
*?Yellow Warbler *Dendroica petechia* (Presumably) a breeding visitor (April – July) along Los Angeles River; otherwise a fairly common transient in spring and early fall. CSC
Yellow-rumped Warbler *Denroica coronata* Abundant winter visitor (Oct. - Apr.)
Black-throated Gray Warbler *Dendroica nigrescens* Fairly common transient.
Townsend's Warbler *Dendroica townsendi* Fairly common transient and scarce winter resident
Hermit Warbler *Dendroica occidentalis* Uncommon transient, mainly spring.
MacGillivray's Warbler *Oporornis tolmiei* Uncommon transient.
[*Common Yellowthroat *Geothlypis trichas*] Breeding resident in reeds along Los Angeles River; up to eight birds vic. Bette Davis Park in spring 2007 (MSM).
Wilson's Warbler *Wilsonia pusilla* Common transient; rare in winter near water.
Yellow-breasted Chat *Icteria virens* Rare transient. CSC
Western Tanager *Piranga ludoviciana* Fairly common transient.
*Spotted Towhee *Pipilo maculatus* Common breeding resident (absent Los Angeles River).
*California Towhee *Pipilo crissalis* Common breeding resident.
*Rufous-crowned Sparrow *Aimophila ruficeps* (Presumably) breeding resident in open scrub habitat on steep slopes, with pairs seen widely in 2007/08. CWL
Chipping Sparrow *Spizella passerina* Transient, mainly around lawns.
*?Lark Sparrow *Chondestes grammacus* Local breeding resident in scrubby grassland on north slope of park, incl. back area of Forest Lawn (where it bred in 2002, *fide* R. Barth; 3 pairs present here 16 May 2007, DSC), and through spring at Toyon Landfill (MB, DSC), with a copulating pair here on 27 Apr. 2007 (MB). Otherwise a transient and winter visitor to picnic areas along east side of park.
Fox Sparrow *Passerella iliaca* Winter resident in native scrub.
*Song Sparrow *Melospiza melodia* Breeding resident in riparian areas and lush plantings; and locally in residential areas (vic. Hollywood Reservoir).
Lincoln's Sparrow *Melospiza lincolnii* Transient and winter resident.
Golden-crowned Sparrow *Zonotrichia atricapilla* Abundant winter resident, particularly in native scrub.
White-crowned Sparrow *Zonotrichia leucophrys* Common winter resident.
Savannah Sparrow *Passerculus sandwichensis* Fall transient to large lawns.
*Dark-eyed Junco *Junco hyemalis* Mainly a winter resident, but small resident breeding population in Western and Vermont canyons and near Merry-Go-Round (lower Fern Cyn.) and possibly in Vermont Canyon. Nesting records incl. 2 juveniles and several singing males at Merry-Go-Round on 22 June 2007 (DSC), with breeding also noted in 2008 (DSC, JF).
*Black-headed Grosbeak *Pheucticus melanocephalus* Breeding visitor, nesitng mid-summer. One pair bred at Bette Davis Park in spring 2007 (M. San Miguel); fledglings noted on 12 July 1995 (HOL 2) and on 14 July 1996 (BUR 5).
*?Blue Grosbeak *Guiraca caerulea* Possible breeding resident or summer visitor; singing birds noted at Toyon Landfill on 27 Apr. 2007 (MB) and on 12 May 2007 in a revegetated area near Lake Hollywood (DSC).
*Lazuli Bunting *Passerina amoena* Breeding visitor, at least after wet winters; birds feeding young noted in canyon along Forest Lawn Dr. on 30 May 2008 (DSC); common spring transient in native vegetation.
[*Red-winged Blackbird *Agelaius phoeniceus*] Breeding resident, mainly along vegetated portions of Los Angeles River. Nest-building observed on 12 May 1996 (BUR 6) and fledglings on 23 June 1996 (HOL 2), with several pairs nesting in summer 2007 (MSM).
*Brewer's Blackbird *Euphagus cyanocephalus* Breeding resident around lawns in developed portions of park.

*Brown-headed Cowbird *Molothrus ater* Breeding resident, probably most common in spring/summer.
*Hooded Oriole *Icterus cucullatus* Breeding visitor, mainly in developed areas (esp. palms) along perimeter of park (and in adjacent residential areas). Nesting records include occupied nest on 23 Apr. 1995 (BUR 6).
*Bullock's Oriole *Icterus bullockii* Common breeding visitor along Los Angeles River and in picnic areas with large sycamores; a few winter records.
*Purple Finch *Carpodacus purpureus* Breeding resident, esp. around planted conifers; pair building a nest on 20 Apr. 2008 in the Bird Sanctuary (DSC).
*House Finch *Carpodacus mexicanus* Common breeding resident.
Pine Siskin *Carduelis pinus* Irregular winter visitor, absent some years; partial to planted conifers.
*Lesser Goldfinch *Carduelis psaltria* Breeding resident.
*?American Goldfinch *Carduelis tristis* Local (probable) breeding resident in small numbers along vegetated portions of the Los Angeles River (DSC, MSM); widespread in winter in picnic areas.
Lawrence's Goldfinch *Carduelis lawrencei* Uncommon and irregular visitor, mainly detected flying overhead.
**House Sparrow* Passer domesticus *Common breeding resident around developed areas.*
[**?Nutmeg Mannikin* Lonchura punctulata *Resident (?) along vegetated portions of Los Angeles River; possibly breeds (pair at Los Feliz Blvd. 16 May 2007, DSC).*]

Extirpated

Golden Eagle *Aquila chrysaetos* Historically nested in the park, with six egg sets collected (undated; WFVZ). Most recent record is of one in May 1970 at Brush Canyon (KLG). CFP
Greater Roadrunner *Geococcyx californianus* One historical record for Griffith Park in 1915 (SDNHM 22060), and listed as a "rare permanent resident" in Brush Canyon by Garrett (1970; undated). However, the lack of recent sightings suggest that this species is no longer present.
Spotted Dove Streptopelia chinensis *Virtually extirpated; formerly resident (pre-2000), mainly in urban areas adjacent to park. A non-native species introduced from Asia.*
Loggerhead Shrike *Lanius ludivicianus* Rare visitor; formerly much more common, at least in winter (Garrett 1970; undated). Recent sightings (2 birds near Vermont Cyn. tennis courts in Dec. 2007, DSC) in burn area may indicate wintering attempts. CSC0
Black-chinned Sparrow *Spizella atrogularis* Historically nested in or near the park, with eggs collected in the "Hollywood Mtns." (undated; WFVZ 177826), and a bird collected at Cahuenga Pass in 1904 (CAS 40309).

Sources:

Garrett, K.L. Undated. Birds of the western Griffith Park Area. Unpublished annotated checklist. Compiled c. 1970

Garrett, K.L. 1970. Birds of Brush Canyon. Unpublished annotated checklist. Oct. 14, 1970.

Los Angeles County Breeding Bird Atlas data, courtesy K.L. Garrett, Museum of Natural History, Los Angeles Co.

"LACoBirds", a Yahoo Group (archived at: http://groups.yahoo.com/group/LACoBirds/).