

## **Draft Habitat Management Plan for Debs Park**

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### **Executive Summary**

Debs Park has the potential to become a national model of cooperation between the public and private spheres as a multi-use, urban open space area. Habitat management of Debs Park will be an ongoing process that will depend on compromises being reached between two seemingly opposed interests—ensuring public safety versus providing a wilderness experience—all at a reasonable cost. It will require buy-in from the community as well, since the park is, above all, a public space.

Audubon-California and the city's Department of Recreation and Parks will initiate a series of pilot projects to restore the plant and animal communities that were found in the region prior to its urbanization. Some will require little intervention, like open-canopy walnut woodland. This shrubby woodland has proven highly resistant to exotic plant species invasions. Simply reducing the conspicuous threats to this habitat (e.g. off-leash dogs trampling the understory, garbage dumping) may be enough to ensure its health. Other habitats, such as native grassland, have fared less well, and will require wholesale restoration projects.

Large-scale habitat restoration projects are being undertaken throughout Southern California. Dan Cooper, a biologist for Audubon in Los Angeles, has engaged the support of various experts, including Ted St. John of Tree of Life Nursery (San Juan Capistrano) and faculty members of the Center for Conservation Biology at University of California, Riverside. Audubon will coordinate the help of volunteers along with professional consultants and landscapers to ensure buy-in from the community. The Santa Monica Mountains Conservancy's Elyria Canyon in nearby Mount Washington provides an excellent model of this cooperation.

Habitat management at Debs Park will rely on ecological monitoring to measure its success. Audubon staff will develop a set of indicator species whose presence provides rough information about the health of the ecosystems before, during, and after restoration and land use changes. Models for this include Audubon's Kern River Preserve in Kern County, where the success of riparian restoration has been tracked by the re-appearance and proliferation of sensitive bird species. Since Debs Park is a fraction of the size of the Kern, small vertebrates and

invertebrates (especially butterflies) will be used extensively in monitoring protocol.

Like all restoration projects, we will learn as we go. This experiment will require constant tinkering to ensure that as much of the native flora and fauna as possible returns to Debs Park while balancing the park's current uses, which include playing soccer, picnicking, and dog-walking. This is a long-term project that will require extensive coordination between National Audubon Society, the City of Los Angeles, and the Northeast Los Angeles community. However, the rewards will be ample in what is sure to become a model of public-private cooperation in balancing conservation education and research with recreation in an urban setting.

## **Introduction and Goals**

Los Angeles has not been friendly to native wildlife. Its rivers were diverted into concrete channels during the early 1900's, and its oak savannah and wide, grassy wildflower fields that once stretched from the coast to the foot of the mountains were eventually buried under tract homes and freeways. However, pockets of native vegetation have somehow remained in landscape, providing a reminder of a more pastoral history. One region of the city that has tenaciously held on to this past are the neighborhoods along the Arroyo Seco, a major tributary of the Los Angeles River. Located just minutes northeast of downtown's skyscrapers, historic homes and sycamore-lined streets represent a slower-paced life physically within yet far removed from the city.

Rushing down from the San Gabriel Mountains through Pasadena, the seasonal flow of the Arroyo Seco, or "dry wash" in Spanish, passes steep hillsides clad with chaparral and oaks. Farther downstream, in the Garvanza and Highland Park districts of Los Angeles, the vegetation on the hills switches to a woodland of Southern California Black Walnut, a tree found nowhere else on Earth outside the Los Angeles Basin. One of the most extensive examples of this woodland may be found within Debs Park on the last undeveloped hillside along the Arroyo before its confluence with the Los Angeles River. Currently managed by the City of Los Angeles, Debs Park is unique, not just because of its array of plants and animals endemic to Southern California, but also because of its location in a heavily-urbanized, park-poor area.

This location, however, comes with a price. Due to its isolation from larger blocks of habitat further upstream along the Arroyo Seco, Debs Park has already seen degradation of its natural resources. California Quail, California's state bird, was once common in the park's native walnut woodland and brushy slopes, but has not been seen in at least ten years. Other ground-dwelling and sedentary organisms that should be common in the park are scarce or absent, and often only the most ubiquitous members of various families of animals remain: Western Fence-Lizard is the only lizard, Gopher Snake the only snake. In many cases, exotic species have replaced native ones: Eastern Fox Squirrel, introduced from the Eastern U.S., is abundant while Western Gray Squirrel is absent, and native Harvester Ants, one of the anchors of the California food-chain, has been replaced by the less palatable Argentine Ant.

Successful habitat management at Debs Park should enhance the natural interactions among native species without sacrificing existing recreational opportunities. This will involve both

the restoration of specific habitats as well as limited changes in current management practices. These are described below by habitat type, and include descriptions of wildlife likely to benefit from the suggested measures. While this plan focuses on the undeveloped northern half of the park, it addresses certain activities (e.g. disking of grassy slopes) that affect the rest of the system.

The implementation of these recommendations will be the joint responsibility of the City of Los Angeles and National Audubon Society, and is not intended to give additional work to the current staff of the park. It is hoped that this will result in a more sustainable park whose management relies more on natural processes and less on human intervention.

## **Explanation of Terms**

### *Habitats and natural communities*

“Habitat” is basically a description of the physical environment where something lives at a given time. Organisms that share the same habitat are considered to be part of a “community”. Thus, an “urban garage community”, for example, might include termites, house mice, rats, and cockroaches. A vacant lot community would include a few species of plants that can survive in urban situations, as well as honeybees, palm trees and ants. Nearly all the organisms that live in the city, or urban, portion of Los Angeles were brought here from other continents. While these exotics have successfully inserted themselves into the region’s habitats, they are not considered “natural” by ecologists. Instead, they are considered factors that disturb or degrade natural communities.

While a few native plants and animals in the area have adapted well to urbanization, most species have retreated to scattered patches of native habitat, such as oak woodland and chaparral, often located on the steepest slopes. As these patches of this habitat become more isolated, they are increasingly susceptible to invasion by the “weedy” critters thriving in the city. Thus, active management, including restoration (described below) is required to reestablish and to maintain natural interactions within cities—a hawk diving for a ground-squirrel; a tiger swallowtail caterpillar feeding on a sycamore leaf. These are elements of natural communities that have since been lost over much of Los Angeles, but that still persist in Debs Park and the lower Arroyo Seco.

### *Importance of natural communities*

Some of the benefits from preserving native plants and animals are tangible. Native plants are drought-tolerant and don’t require irrigation expenses. Exotic grasses and mustard become tinder-dry and burn easily during the summer, requiring fire-fighting expenditures. Exotics overrun the landscape and are less aesthetically pleasing than natives, particularly once the observer learns to recognize them. Working with nature rather than against it is generally cheaper in the long run.

However, many benefits are less tangible. What is an active hawk nest worth? How can one quantify the loss of quail from the park, which disappeared during last 10 years, or roadrunner, which was probably lost even earlier?

The management of urban parks has too often ignored their natural components, and instead has been concerned with achieving the optimal conditions for easy garbage collection, police surveillance, etc. However, given the current state of natural resources within urban Los Angeles, single-purpose solutions are no longer acceptable. The gradual transition to those that demonstrate sensitivity to natural communities and landscapes is critical in maintaining meaningful natural experiences for visitors to Debs Park.

#### *Restoration vs. management*

Ecological *management* involves promoting natural elements while minimizing the impact of non-natural ones, including exotic species and human-created features. Although nothing can ever be considered pristine, it is always possible to eliminate or reduce threats to native processes.

Ecological *restoration* is a management technique that relies on horticultural techniques to steer a landscape toward a "pre-disturbance" condition. Since this condition is typically unknowable, land managers rely on ecologists with local expertise to identify which biological elements are appropriate for a given site. While it is assumed that humans are often the ultimate agents of disturbance, either directly (e.g. fires) or indirectly (e.g. species introductions), restoration accommodates the presence of people in the system.

Restoration involves both *active* and *passive* techniques. *Active* restoration includes habitat creation, including planting, irrigating, and maintaining vegetation. It can also involve re-introductions of species in cases where humans have extirpated elements of the natural community. Active restoration is typically used only in situations where the ecological community has been irreversibly disturbed. Examples may include weedy vacant lots in cities, former mines or sites isolated by urban development.

*Passive* restoration relies on existing vegetation to recover on its own, and focuses more on the reduction of threats. This can include removing exotic/pest species, fencing sensitive areas, and changing current management styles. Passive restoration is frequently employed before active restoration, as it is often cheaper and less intrusive to the pre-existing natural community.

### **Debs Park as a Natural Resource**

#### *Physical setting*

Debs Park is situated in the Repetto Hills, a region of clay-rich sedimentary deposits uplifted from the Los Angeles Basin floor into low (<1000') hills. These hills extend from Elysian Park near downtown Los Angeles east to Whittier Narrows in the southern San Gabriel Valley, and are known by several local names, including Mount Washington, Monterey Hills, and Montebello Hills. Although they lie near the Santa Monica Mountains (Griffith Park) and the San Gabriel Mountains (Verdugo and Linda Vista Hills), their geology and vegetation more closely resembles that of the Puente, San Jose, and Chino Hills that form the eastern rim of the Los Angeles Basin. The Repetto Hills are bisected by three antecedent streams: the Los Angeles River, its tributary the Arroyo Seco, and the San Gabriel River in the east. The Arroyo Seco ("The Arroyo") forms the western boundary of Debs Park.

About half the park, basically the entire northern end, is strongly dominated by native vegetation. Elsewhere in the park, native vegetation is confined to strips and patches away from the developed portions (incl. picnic areas, ball fields, etc.). Since the wildlife of the park does not always see the same barriers we do, the entire park should be considered "habitat".

#### *Historical condition*

The original (i.e. pre-Columbian) structure of the vegetation of the park is difficult to assess. Sheep grazing, notoriously damaging to both vegetation and soil, occurred as late as the 1950's. Photographs from the early 1900s that depict barren hills with scattered walnuts present a situation even more degraded than that today. The overall biomass of vegetation in the park has doubtless increased markedly since the elimination of sheep. However, this has been partially offset by the proliferation of non-native and pest species that are probably suppressing the regeneration of chaparral and coastal sage scrub, contributing to the lack of recovery of the native plant communities. It is not known to what extent active fire suppression has had on the balance of these habitats in the park.

Today, the habitats within Debs Park vary greatly in "natural-ness". Some, such as the open-canopied walnut woodland on the northwest slope of the park, are relatively untouched by exotic species and are structurally intact. Others, such as grassland, are nearly overrun by invasive plants and are in great need of restoration and active management.

#### *Native communities*

The major plant communities of Debs include a shrubby woodland dominated by Southern California Black Walnut (*Juglans californica*), Toyon (*Heteromeles arbutifolia*) and Coast Live Oak (*Quercus agrifolia*), with an understory of Poison Oak (*Toxicodendron diversilobum*), Hollyleaf Redberry (*Rhamnus ilicifolia*), and Chaparral Honeysuckle (*Lonicera subspicata*). Structurally, this habitat resembles chaparral in being composed mainly of large, tree-like shrubs and offering little shade. However, typical chaparral plants such as Chamise (*Adenostoma fasciculatum*), Mountain-Mahogany (*Cercocarpus betuloides*) and *Ceanothus* spp. are absent or very scarce in the Repetto Hills. Also unlike chaparral, this woodland tends to be destroyed by fire, and often persists only in deep gullies in the Repetto Hills (pers. obs.).

On south- and east-facing slopes, walnuts strongly dominate and form a closed-canopy woodland above a largely herbaceous understory of exotic Mustard (*Brassica nigra*) and exotic annual grasses. The distinction between these two types of woodland (open- and closed-canopy) may be the result of both historical as well as current habitat management practices (see below). At the very least, the ecotone (boundary) between open- and closed-canopy woodland is dynamic throughout the park.

A small (<5 acre) area of coastal sage scrub dominated by California Sagebrush (*Artemisia californica*), Black Sage (*Salvia mellifera*) and buckwheats (*Eriogonum* spp.) occurs adjacent to Griffin Rd. in the northwest corner of the park. Elements of this habitat are also found locally on steep road cuts and slopes throughout the park, illustrative of the specialized edaphic (soil-related) requirements of this vegetation.

Well-developed riparian communities are essentially absent, although their elements,

including Western Sycamore (*Platanus racemosa*), Mulefat (*Baccharis salicifolia*) and Desert Wild Grape (*Vitis girdiana*) are scattered throughout the park. Groves of mature sycamores along the Arroyo Seco just outside the park's borders were once contiguous with the park's open space, and should be considered as part of the Deb's Park ecosystem.

Extensive grassland at Debs is strongly dominated by exotics, particularly Mustard. Patches of native grasses, including Purple Needlegrass (*Nassella pulchra*) and California Brome (*Bromus carinatus*), are found throughout the park's natural communities, particularly on roadcuts.

### *Exotic plants*

Exotic plants pose perhaps the greatest threat to maintaining the natural-ness of Debs Park. These species are most prevalent in disturbed habitats such as trail edges and disked areas. Of the native habitats, open-canopy walnut woodland has the fewest exotics, whereas grassland and closed-canopy walnut woodland may have the most. Coastal sage scrub seems susceptible to invasions by specific species, particularly Tree Tobacco (*Nicotiana glauca*) and mustard. Despite the widespread awareness of the threat exotic species pose to native landscape, introduced species continue to be *encouraged* in the park, either by direct planting (e.g. Aleppo Pine *Pinus halepensis*) or by disking (e.g. Castor Bean *Ricinus communis*).

With a few exceptions, exotic species tend to thrive in disturbed areas. Thus, inappropriate fire-control activities (e.g. disking outside the 200' buffer required) have encouraged serious invasions by noxious weeds like Castor Bean. The result is a vicious cycle whereby these weedy fields either burn annually, or require annual disking to keep them from doing so.

While some exotics should be removed immediately due to their tendency to overrun native vegetation and resist control efforts, others are of lower priority. Appendix 4 summarizes the exotic species of Debs Park and prioritizes their removal.

## **General Habitat Management Priorities**

- 1) Adopt park-wide fire management practices compatible with native wildlife.
  - a. Establish clearly-designated buffer zones (around structures) of minimal size to ensure fire safety, and shift from disking to mowing and/or hand-clearing in buffer zones.
  - b. Establish clearly-designated areas of the park where vegetation can be allowed to develop naturally (i.e. without being cleared or disked).
  - c. Maximize amount of native vegetation allowed to develop along fire roads, which currently serve as the major trail system for the park.
  - d. Minimize removal of standing or fallen dead wood to enhance habitat for wildlife.
- 2) Remove and control "Priority I" and, where feasible, "Priority II" exotic species (see above), and use native species, rather than exotics, in any new plantings (see Appendix 3)
- 3) Establish a habitat restoration and ecological monitoring program
  - a. Use multiple pilot sites for testing techniques
  - b. Employ local volunteer labor where possible
  - c. Incorporate restoration and monitoring in educational programs

- 4) Enhance and encourage habitat linkages for sedentary and/or ground-nesting taxa (e.g. California Quail *Callipepla californica*) on park's borders
  - a. Investigate nearest sources of colonization by these taxa
  - b. Support ongoing conservation and revegetation efforts along Arroyo Seco to increase the overall amount of native habitat in the landscape
- 5) Develop a homeowner education program on responsible pet ownership, similar to those initiated elsewhere in urban-wildland interface situations
- 6) Initiate a nesting-success study for birds to determine threats

### **Management Recommendations by Habitat**

During the 1980s, Soulé et al. (1992) studied birds in San Diego chaparral fragments (open space surrounded by urbanization) and found that patches under 100 hectares were not able to maintain a full complement of native species. The bird community at Debs Park, which protects no more than 50 hectares of native habitat, bears this out. Some of these species losses have been surprisingly recent. A local resident (S. Wiley, pers. comm. 15 July 1999) noted that California Quail were present in the park up until about 10 years ago, when the population crashed. They have not been reported since. California Thrasher (*Toxostoma redivivum*) was observed as recently as March 1999 (K.L. Garrett, pers. comm. August 1999), but not since and may be extirpated. The contrast between the intact structure of the walnut woodland and the fact that these otherwise abundant species are extirpated or nearly so suggests that "ecological relaxation" (see also Soulé et al. 1988) has occurred. This refers the gradual replacement of a diverse plant and animal community with a more homogeneous one, typically dominated by widespread, "weedy" species.

While it is possible quail were hunted out (guns and slingshots have been a regular sight in the park for years; S. Wiley and others, pers. comm. 15 July 1999), it is difficult to believe that the secretive California Thrasher was lost to hunting. It is most likely a combination of factors, or "cumulative mechanical insults" (Soulé et al. 1992), from feral cats to increased numbers of corvids (incl. Western Scrub-Jay *Aphelocoma californica*), may be blamed for this loss of species diversity.

Some of these factors can be managed and reversed, such as trampling by dogs off leash and lack of nest sites for cavity-nesting birds. Others, such as feral cats and Argentine ants (*Linepithema humile*) are inevitabilities. The conditions of the major habitats at Debs Park are discussed below, along with suggestions for minimizing the threats currently affecting them.

#### *Open-Canopy Walnut Woodland*

Walnut Forest and Woodland ["California Walnut Woodland" (Holland 1986), "California Walnut Series", "Sumac Series" (Sawyer and Keeler-Wolf 1995)] is a poorly-understood plant community (Holland 1986). What appears to be a fairly stable association of Southern California Black Walnut, Toyon and Coast Live Oak is arguably the most intact natural habitat at Debs Park, owing to its apparent ability to resist invasion by exotic species. Since its dominant species, Black Walnut, is considered a "Rare" species by the California Native Plant Society

(Sawyer and Keeler-Wolf 1995), this woodland is by definition a rare community.

This woodland, along with the closed-canopy walnut woodland (see below) with which it occurs, are among the most threatened habitat types in the country (see Tenbrink et al. *in press*). Both are restricted to low hills (generally <500 meters) of southwestern California (Keeley 1990). Many of the best examples of these habitats coincide with urbanized or soon-to-be-urbanized areas. Frequent fire may be resulting in a gradual conversion of the walnut woodland to grassy walnut savanna and finally to a grassland maintained by frequent fire (see Keeley 1990), as may be seen in the hills around east Los Angeles (e.g. "Ascot Hills", El Sereno).

Among the ecologically important species of this community appear to be mature Coast Live Oaks and walnuts, both mainly confined to the deep, rich soils along gullies, particularly on north-facing slopes (pers. obs., see also Holland 1986 for description). These are particularly valuable to potentially breeding bird species in the park that are largely absent from adjacent urban areas during the nesting season (pers. obs.), including Northern Flicker (*Colaptes cafer*), White-breasted Nuthatch (*Sitta carolinensis*), Ash-throated Flycatcher (*Myiarchus cinerascens*), Hutton's Vireo (*Vireo huttoni*) and Black-headed Grosbeak (*Pheucticus melanocephalus*), all of which were observed in the park during the summer of 1999. The downed wood within the woodland provides habitat for reptiles and amphibians, including a Slender Salamander (*Batrachoseps* sp.), detected in March 1999 (K. Garrett, pers. comm. 05 March 1999).

Other birds, including Blue-gray Gnatcatcher (*Polioptila caerulea*), Wrentit (*Chamaea fasciculata*), and Spotted Towhee (*Pipilo maculatus*) are dependent on the dense, native understory of this woodland, and are also scarce in residential areas.

#### Restoration Goals:

- 1) Eliminate exotic taxa from gaps and edges within the habitat
- 2) Increase the amount of native woody vegetation along the edges of trails and fire roads to reduce weed invasions and enhance hiking/educational experience
- 3) Reduce the sources of excess nitrification (i.e. dog urine and feces) along trail edges (see St. John 1999)

Recommendations: As this habitat is comparatively intact, its restoration will rely on more passive management activities such as the elimination (by hand) of exotics (e.g. Castor Bean, Horehound) from roadsides and the understory. Horehound may be uprooted by hand and left on soil surface (unless seeds are present), whereas Castorbean removal requires four steps: (From Jo Kitz via email, 01 July 1999):

- 1) Wear gloves, as the entire plant is poisonous
- 2) Cut off fruit and place into containers. Dispose of them away from the park or any other natural area
- 3) Cut plants to the ground and stack in a pile

#### 4) Treat the stumps with 50 percent solution of Roundup

This should enable native understory species, particularly scarce ones like California False-Indigo (*Amorpha californica*), Heart-leaved Penstemon (*Keckiella cordifolia*) and Creeping Snowberry (*Symphoricarpos mollis*), to strengthen their presence in the park. Two of only a handful of known penstemon plants in the park were destroyed in July 1999 when 10' buffers were cleared on either side of the roads, and the only California False-Indigo (*Amorpha californica*) known in the park nearly met a similar fate.

Active habitat restoration of open walnut woodland is probably not necessary at this time, since exotic species within the chaparral community itself are few, and probably causing no great environmental degradation within the habitat. However, this could change soon, as Castor Bean is currently proliferating along roadsides, and entering the habitat locally through numerous disturbed areas.

Measures of Success: A study of the status and the threats to the forest and woodland bird species should be undertaken before restoration is credited for any increases or appearances that might occur. For example, Hutton's Vireo was recently discovered as a probable breeder in the park, yet its appearance had nothing to do with restoration. However, a substantive increase in the number and distribution of woodland taxa (see above), as well as the re-establishment of potentially extirpated taxa, such as California Thrasher, Oak Titmouse (*Baeolophus inornatus*) and Orange-crowned Warbler (*Vermivora celata*), could be taken as a measure of success.

Among a large suite of invertebrates that may be monitored (see Thomas 1994) several butterfly species, including Sleepy, Propertius and Mournful Duskywings (*Erynnis* spp.), Great Purple Hairstreak (*Atlides halesus*), Mountain Mahogany and Gold Hunters Hairstreaks (*Satyrrium* spp.) and California Sister (*Adelpha bredowii*), are typical of oak woodlands, and should be watched for (M. Huffman, pers. comm.).

The only woodland reptile or amphibian detected in preliminary investigations of the park is a slender salamander (*Batrachoseps* sp.). While its status is unknown, it would doubtless benefit from a change in maintenance that allows fallen wood to remain on the ground. Other woodland amphibians including Arboreal Salamander (*Aneides lugubris*) should be searched for and protected.

#### *Closed-Canopy Walnut Woodland*

Most of this habitat occurs on more level terrain than open-canopy woodland, and on south and east-facing slopes such as along Monterey Rd. (see Holland 1986). Unlike the more diverse open-canopy woodland, its canopy is a virtual walnut monoculture, with understory shrubs comparatively rare. Due to the shade cast by these trees, the understory is largely comprised of exotic grasses. Historical grazing was probably responsible for the original invasion of several exotic grasses into the understory of walnut woodland (see Tenbrink et al. *in press*). However, these grasses are thoroughly entrenched in the system, and will probably only be eliminated through active restoration (e.g. St. John 1999).

This woodland at Debs Park is overwhelmingly composed of young, multi-stemmed trees. In the late 1980's, according to Keeley (1990), nearly half of the stems ("trunks") of walnuts in this habitat at Debs were five years old or younger. While some older trees (maximum 81 years) were present, the woodland is much younger than other examples in the Los Angeles area (e.g. that on Mt. Washington, *Ibid*). This may account for the abundance of walnut seedlings in its understory and in adjacent grassland (pers. obs.; also Keeley 1990). Oddly, very few seedlings of the other trees and shrubs (e.g. Toyon) have been observed in the understory of the walnut woodland at Debs (pers. obs., *contra* Keeley 1990); an observation shared by workers at nearby Mt. Washington (J. Schneider, pers. comm.). This may be the result of intense competition with mustard and other exotic annuals (Mullally 1992).

In areas with similar land-use regimes, the "natural" understory of closed-canopy walnut woodland in the Los Angeles area probably varies with soil micro-conditions (see Mullally 1992). In areas with large gaps between trees [incl. southern flank of the Puente Hills near Brea (Orange Co.); South Hills Park, Glendora (Los Angeles Co.)], trees are scattered on slopes clad in coastal sage scrub, often with native prickly-pear (*Opuntia* spp.) forming rings around the trees (pers. obs.). In areas where the woodland is more intact (e.g. Phillips Ranch section of Pomona, Los Angeles Co.), the understory on a moist, northeast-facing slope was found to consist mainly of Fiesta-Flower (*Pholistoma auritum*), a species also found commonly in the understory in Debs Park (all pers. obs.).

While restoration of the understory of closed-canopy walnut woodland may incorporate elements of both grassland and coastal sage scrub restoration (see below), the most important feature will be the reestablishment of a natural progression of native vegetation.

#### Restoration Goals:

- 1) Allow the community to develop a native understory wherever it occurs in the park, including patches within the "developed" portions of the park (e.g. on the slope southwest of the main picnic area)

Recommendations: (see grassland restoration description below) The restoration of closed-canopy walnut woodland will depend on the cessation of disking and other practices that disrupt the soil in and around the woodland. Widespread planting of walnuts and other trees should not be necessary, given the high number of seedlings throughout the park, including in recently-disked areas (pers. obs.).

Measures of Success: The conversion of the understory from exotic to native grasses would probably not have a significant impact on the bird population of open walnut woodland, as many of the characteristic woodland species breed in cavities within the trees, rather than within the understory. This community is currently unique due to its herbaceous understory, whether or not this is a sustainable state. The addition of more woody native plants into the understory may make the habitat more appealing for birds of open-canopy walnut woodland (see above), and less for grassland taxa like Western Kingbird (*Tyrannus verticalis*). Since this community is so poorly known, we expect to be learning about its native species community as we go.

### *Grassland*

Maintaining a native grassland bird community at Debs Park is important to encourage and restore regional diversity of native birds and invertebrates. Though restoration projects often treat grassland as a blank slate in which to plant trees and shrubs, rolling, grassy hills such as those of Debs Park are comparatively rare in Los Angeles. Most open space in the region persists on steep, chaparral-covered slopes with narrow canyon bottoms (e.g. Griffith Park); Though little grassland-dependent fauna currently utilize Debs Park, further loss of this habitat to woodland would jeopardize any continued use or recolonization by grassland species. Rather, an approach that encourages native forbs and grasses and discourages exotics *without losing the herbaceous nature of the community* is recommended. Anderson (1996) suggests aiming for "a weed free and biologically diverse grassland that is self-perpetuating and sustainable."

The original composition and extent of grassland in California is subject to debate (see Freudenberger et al. 1987). It is generally agreed that native grasses naturally occurred as a mosaic with coastal sage scrub and other habitats in the Los Angeles Basin. The annual grasses seen today on the hillsides around Los Angeles (e.g. "Ascot Hills", El Sereno), as well as the grassy plains surrounding Indian villages described by early explorers are undoubtedly the remains of scrub communities that have been burned often enough to remove woody material from the soil (see Freudenberger et al. 1987). While this describes the dynamics of the scrub-grassland boundary, it does little to explain the continued dominance of exotic annuals over native perennials. This has been found to be linked to the disturbance of soil structure and associated mycofloral (i.e. the natural fungi on the roots of the plants) changes (e.g. St. John 1999).

Not surprisingly, the richest native grasslands (e.g. the Santa Rosa Plateau and vic. Lake Skinner, Riverside Co.) are generally associated with coastal sage elements. Thus, any grassland restoration should be in the context of a more general coastal sage scrub restoration that includes expanses of native grasses. Within Debs Park, recent examination of the remaining coastal sage scrub patches (pers. obs.) confirms that these natives are still in the seed bank, with small areas of Purple Needlegrass, California Brome, Blue-eyed Grass (*Sisyrinchium bellum*) and Golden-Stars (*Bloomeria crocea*) scattered throughout.

Several grassland bird species accept exotic mustard for nesting and foraging, including Red-winged Blackbird (*Agelaius phoeniceus*) and Common Yellowthroat (*Geothlypis trichas*). Raptors forage for rodents in these exotic grasslands, including Turkey Vulture (*Cathartes aura*), White-tailed Kite (*Elanus leucurus*), American Kestrel (*Falco sparverius*) Barn Owl (*Tyto alba*) and Loggerhead Shrike (*Lanius ludovicianus*). These birds have very little habitat left in the Los Angeles area, and their persistence should be encouraged by maintaining the large patches of open grassland currently in the park.

#### Restoration Goals:

- 1) Establish a native, herbaceous community large enough to support a diverse array of grassland-obligate species of birds, herps, and invertebrates

#### Recommendations: (see Appendix 2 below)

### *Coastal Sage Scrub*

Much of the L.A. Basin was probably covered with coastal sage scrub historically (Kuchler 1977), though it is now mainly buried under concrete or converted to exotic grassland. It might be much more extensive in Debs Park were it not for the clay soils here which are particularly attractive to exotic grasses and mustard. In equally fire-prone and urbanized areas with different soils, such as the nearby Linda Vista Hills of Pasadena, patches of coastal sage scrub are common.

The best-developed stands are on the west-facing slope of the park, particularly on a southwest-facing slope of a small, isolated hill across from the north end of the Montecito Heights Recreation Area along Griffin Ave. Elements of the habitat (esp. California Sagebrush) are slightly more widespread, particularly along road cuts. This habitat within the park appears to have been highly disturbed, as it is missing components notoriously sensitive to fire such as White Sage (*Salvia apiana*), which may be found just east of Monterey Rd. (pers. obs.).

Several plants and animals protected by Federal and State Endangered Species laws are dependent on coastal sage scrub, but the amount at Debs Park may be too small to support them. Distinctive birds of coastal sage scrub (i.e. favoring it to chaparral) include Greater Roadrunner (*Geococcyx californianus*), Costa's Hummingbird (*Calypte costae*), Rufous-crowned Sparrow (*Aimophila ruficeps*), California Gnatcatcher (*Poliopitila californica*), and Cactus Wren (*Campylorhynchus brunneicapillus*). None has been observed recently in Debs Park, though all are present elsewhere in the Repetto Hills (e.g. Montebello Hills adjacent to Whittier Narrows).

With expansion and enhancement of the habitat, including an increased density of native plants and a concurrent removal of exotics, these and other coastal sage scrub taxa could return to the park. Rufous-crowned Sparrow is persisting in isolated patches of the habitat nearby (e.g. adjacent to Occidental College, M. San Miguel, pers. comm.), and Costa's Hummingbird winters in the area (pers. obs.).

However, if the truly sedentary species (see Appendix 1) are truly gone from Debs Park, successful restoration of the habitat would be incomplete unless appropriate linkages are made with more extensive habitat in the region (i.e. farther up the Arroyo Seco). Re-introduction could be explored, although this may not be an ecologically viable solution, as it only restores singles element of this complex habitat.

#### Restoration Goals: (See Appendix 1 below)

- 1) Establish a large, intact parcel of coastal sage scrub derived from and composed of native plant taxa already present in Debs Park and vicinity (e.g. Mt. Washington).
- 2) Attract enough coastal sage scrub obligate taxa that this community is distinct from the adjacent walnut forest/woodland and grassland.

#### Recommendations: (See Appendix 1 below)

#### Restoration Success and Budget: (See Appendix 1 below).

### *Riparian*

The riparian habitat of the lower Arroyo Seco south of York Blvd. has been essentially eliminated, though remnants remain in the vicinity of Debs Park. The northwest corner of the park adjacent to Via Marisol supports dense growth of Desert Wild Grape (*Vitis girdiana*), along with several mature sycamores, adjacent to the channel of the Arroyo. Northeast Trees, a local tree-planting group, maintains a planting of sycamores, White Alder (*Alnus rhombifolia*), and other riparian trees at the base of the park's northern slope here. This site has very little understory, now largely woodchips spread by Northeast Trees for their plantings. Contact with water from the Arroyo is nonexistent, and contributes to the lack of riparian understory.

The second riparian zone within Debs Park may be found in the southern end of the park, just west of the baseball fields (a.k.a. "Rose Hills Park"), near the smaller of the two picnic areas. Here, urban runoff from Montecito Heights to the west passes through the park, apparently in sufficient volume to support several Mulefat. Large Mexican Elderberry (*Sambucus mexicanus*) grow adjacent to the drainage, which appears to be cleared-out or bulldozed periodically. This site is thoroughly invaded by numerous exotic species.

A third riparian area exists just south of the proposed site of the nature center (along Griffin Ave.). Its lower reach is basically a drainage area to handle runoff from the development. Exotic species, including a bamboo and Greater Periwinkle (*Vinca major*) are particularly rampant at this site, and little native riparian vegetation remains.

Perhaps the best riparian habitat in the region may be the extensive groves of sycamores in parks along the Arroyo, all of which, unfortunately, have a lawn understory, consistent with their management solely for picnicking. A notable exception to this may be found in Arroyo Seco Park at Avenue 60, where a fenced-off area on the east edge of park preserves a vibrant though small patch of native riparian bottomland forest.

At least four bird species characteristic of riparian woodland, Northern Flicker (*Colaptes cafer*), Downy Woodpecker (*Picoides pubescens*), House Wren (*Troglodytes aedon*) and Bullock's Oriole (*Icterus bullockii*) summer in the sycamore groves adjacent to Debs Park, and Song Sparrow (*Melospiza melodia*) was found in the mulefat thicket on the south end of Debs Park in June 1999. All but Bullock's Oriole are highly localized in the park.

#### Restoration Goals:

- 1) Maintain an exotic-free example of multi-layered riparian vegetation (incl. willows, mulefat, etc.) within Debs Park.
- 2) Investigate the possibility of establishing a native riparian understory within a section of the sycamore grove of Arroyo Seco Park adjacent to Debs Park that supports a native animal community distinct from the walnut woodland within the park.

Recommendations: Volunteer labor should be heavily relied upon for riparian restoration, as has been done at other sites (e.g. National Audubon Society's Kern River Preserve). As with the other habitats, removal of exotics and maintenance of a native

understory is a top priority.

Restoration Success: Because of the mobility of riparian organisms, early success should be evident. Song Sparrow and Common Yellowthroat are among the first birds to recolonize young, scrubby riparian habitat (see Garrett 1993). Blue Grosbeak (*Guiraca caerulea*) and Yellow-breasted Chat (*Icteria virens*) could use the site if enough open grassy habitat is allowed to develop nearby (i.e. is not disked). Other potential colonizers include Lorquin's Admiral (*Limenitis lorquini*), Mourning Cloak Butterfly (*Nymphalis antiopa*) and Pacific Treefrog (*Hyla regilla*).

Any restoration that enhances the understory of the sycamore groves in Arroyo Seco Park should attract House Wren and Downy Woodpecker. Species like Yellow Warbler (*Dendroica petechia*), Warbling Vireo (*Vireo gilvus*) and Western Wood-Pewee (*Contopus sordidulus*), historically common in the area (Garrett and Dunn 1981) are also possible nesters since all are common migrants, but are much less likely to breed due to their rarity in the region during the summer. Additional taxa that would benefit from restoration of sycamore groves include Western Tiger Swallowtail (*Papilio rutulus*), present in low numbers in the region (pers. obs.).

Budget: Weed-clearing implements similar to those used for coastal sage scrub restoration (see Appendix 1) will constitute the main hard costs for the riparian scrub restoration within the park. The sycamore grove restoration will involve planting container plants and installing a suitable irrigation system that would ideally take water directly from the adjacent Arroyo Seco and allow it to spread onto the site, similar to what has been done farther upstream along the Arroyo (vic. Arroyo Dr. and California Blvd., Pasadena).

### *Pond*

The small reservoir at the highest point in Debs Park has potentially the highest value for interpretive use of any feature in the park, yet is among the most in need of restoration. Since Los Angeles is located along the Pacific Flyway, a major migration route for waterbirds, thousands of ducks pass through the region each year, stopping at small ponds like this one, and many stay throughout the winter. The fact that most waterbirds and aquatic invertebrates are large, charismatic, and conspicuous, and given the pond's position at the top of a hill, it is a popular and natural destination for visitors to Debs Park.

Two main issues result in the pond being currently unattractive to wildlife. First, its edges are currently sprayed regularly with herbicide to control all vegetative growth around its perimeter, leaving it with bare earthen banks and virtually no aquatic vegetation. Second, people can and do walk around its entire perimeter, which, given its small size, gives birds and other wildlife nowhere to hide. As leash laws are not enforced within the park, dogs frequently splash through the pond (pers. obs.).

### Restoration Goals:

- 1) The development of the pond as a showcase for a constructed wetland habitat, whose focus is the passive study of riparian, wetland, and aquatic organisms,

particularly wading birds.

- 2) The pond is to be designed and managed in such a way that regular maintenance does not conflict with the above goal.

Recommendations: Since constructed wetland design is a complex art, we urge the hiring a qualified consulting firm to redesign the entire pond. However, as an interim measure, we recommend:

- An immediate cessation or reduction of spraying around the pond's border.
- Planting a band of non-weedy native vegetation around its border (e.g. *Carex praegracilis*, *Eleocharis macrostachya*, *Juncus* sp., *Muhlenbergia rigens*).
- Restricting human access to a small portion of the edge.

Restoration Success: Given the current highly-degraded state of the pond, the above recommendations will likely attract numerous migrant and wintering waterbirds. Since its primary purpose would be an interpretive opportunity, it need not be managed for single species or even species diversity. However, Virginia Rail (*Rallus limicola*) and Common Moorhen (*Gallinula chloropus*) would be expected to use restored marsh vegetation at least during migration and winter, and Common Yellowthroat and Song Sparrow would probably colonize any riparian growth as nesters. Nest boxes placed on trees around the pond would likely be vandalized, and are not recommended.

Budget: Restoration of the pond should be done entirely through a contract with a consulting firm.

## **Appendix 1.** Coastal Sage Scrub Restoration Experiment

### Project 1. A comparative study of coastal sage scrub restoration

*Introduction and Methods*: The focus of this project is to assess the effects of planting native material, pulling and treating exotics, and fire on coastal sage scrub. This study will be largely qualitative, and will serve as a pilot study only to determine effective methods of coastal sage scrub restoration for Debs Park. It will also assist in determining whether enough native seed bank is left for a more passive approach toward future restoration, or whether direct planting is necessary.

Due to the degraded condition of the habitat (weeds, bare patches), active restoration techniques (e.g. hydroseeding, planting of container plants, etc.) may be necessary (C. Wishner, pers. comm.). These techniques have been found to vary considerably in their effectiveness, even within small sites, due to micro-habitat variation in soil type, slope, etc. (see Miner et al. 1998; O'Connell and Erickson 1998). Therefore, we recommend initiating a restoration experiment that tests several techniques simultaneously before they are applied elsewhere in the park.

Several small (c. 20 X 20 meter, per C. Swift, pers. comm. 19 August 1999) pilot restoration plots will be established, using the following treatments (along with control plots).

- Removal (and/or treating by a biodegradable herbicide) of exotics and the planting of locally-propagated natives (see Appendix 3 below) with an irrigation system. Removal of exotic species should commence during the summer and involve hand-pulling (and removing from site) all exotic plant material.

[The steepness of the park dictates that neither disking nor seed-drilling will be feasible (per recommendation of O'Connell and Erickson 1998). Thus, the clearing of Plot 1 will entail hand-cutting and hand-applying Roundup to Mustard and exotics in late winter, prior to setting of seed of those plants (J. Anderson, pers. comm). A second treatment of Roundup, per O'Connell and Erickson (1998), will be done in early April. Since hydroseeding practically dictates that plant material will be from off-site, container plants of desired species (see Appendix 3) will be planted at a density to be determined by sampling nearby stands of intact coastal sage scrub (C. Swift, pers. comm. 19 August 1999)].

- Removal and herbicide application only (no planting)
- One plot will take advantage of a small fire that recently (early July, 1999) eliminated most of the smaller woody plants above the Griffin Ave. entrance. All emerging exotics will be pulled, and the site will be allowed to regenerate naturally.
- Removal of as much of the exotic flora as possible, along with manually sloughing-off soil along roadcuts.

Plots will be marked clearly with temporary signs (e.g. stakes with laminated cards. The vegetative progress of each site will be assessed using line-transect vegetation surveys that measure dominance of various plant species. Small mammal trapping, amphibian and reptile trapping, and insect sampling (see below) will be undertaken in all plots and in adjacent non-coastal sage scrub habitat before, during, and following restoration to determine whether the habitat restoration is achieving desired results in restoring a distinctive coastal sage scrub fauna. Sampling will commence as soon as possible and continue for at least 5 years after planting.

*Expected Results:* Since coastal sage scrub obligate taxa (as opposed to those of riparian habitats) are notoriously sedentary, attracting them to a restored area will be a slow process, particularly if preliminary investigations, as expected, indicate a totally depauperate community. Of the birds mentioned above ("Management Recommendations by Habitat: Coastal Sage Scrub"), Costa's Hummingbird would be the most likely early recolonizer as a breeder, since it maintains local populations in the region (pers. obs.) and shows seasonal movements (Garrett and Dunn 1981). Greater Roadrunner (*Geococcyx californianus*) could conceivably utilize the Arroyo Seco as a corridor for movement from the San Gabriel Mountains (the species has been observed along channelized sections of the Los Angeles and San Gabriel rivers).

An increase in the amount of Coastal Prickly-Pear (*Opuntia littoralis*) could attract Cactus Wren, and Deerweed (*Lotus scoparius*) could encourage Funereal Duskywing (*Erynnis zarucco*), provided they are in the area (*E. zarucco*) observed July 1999 on Highland Park/Pasadena border). Coastal sage scrub obligates with more limited mobility such as Coast Horned

Lizard (*Phrynosoma coronatum*) and Coastal Western Whiptail (*Cnemidophorus tigris multiscutatus*) are probably gone from Debs Park, but preliminary surveys are needed to confirm this.

The same may be true for such coastal sage scrub-dwelling butterflies as Acmon Blue (*Icaricia acmon*), Silvery Blue (*Glaucopsyche lygdamus*), Bernardino Dotted-blue (*Euphilotes bernardino*); Western Green Hairstreak (*Callophrys affinis*), Behr's Metalmark (*Apodemis virgulti*), and Variable Checkerspot (*Euphydryas chalcedoni*) (M. Huffman, pers. comm.).

Rodent taxa known to be associated with coastal sage scrub (and coastal chaparral) include *Peromyscus californicus*, *P. eremicus*, *P. maniculatus*, *Perognathus fallax*, *Neotoma fuscipes*, *N. lepida*, and *Reithrodontomys megalotis*, and, according to the analysis by Bolger et al. (1997), all could conceivably still persist in Debs Park, based on its size alone.

*Budget:* The main hard costs of the coastal sage scrub restoration will involve the acquisition of container plants, and their maintenance throughout the life of the project which includes monitoring of die-off for three to five years after the initial planting. Due to the large number of plants necessary in even an acre of restoration, it will probably be economical to maintain a small greenhouse on site, similar to that at nearby Elyria Canyon. Other costs will involve irrigation material, as well as herbicide and weed-clearing implements mentioned.

## Project 2. Passive restoration of a coastal sage scrub/native grassland mosaic

*Introduction and Methods:* This second enhancement area is located near the Griffin Ave. entrance in remarkably intact expanse of native scrub and grassland that has apparently been spared frequent fire. Here, the only management will be selective removal and disposal of exotic plants. Pre- and post-restoration species monitoring will be done as above. The budget will be limited to purchase of weed-clearing implements.

## **Appendix 2.** Grassland Restoration Experiment

### Project 1. Conversion of exotic mustard field to native grassland

*Introduction and Methods:* Native grassland, rich in wildflowers and native invertebrates, may have the least resistance to invasion by exotic species. (St. John 1999). The grassland habitat at Debs Park, including the grassy understory of closed-canopy walnut woodland is nearly 100% exotic. Each year, fire and/or disking ensure that it remains so. However, even with these threats are eliminated, it is likely that active restoration will be necessary to convert the exotic vegetation to natives.

The basic principle behind the grassland restoration involves an intentional depletion of available nitrogen (“nitrate immobilization”, or “anti-fertilizer”) combined with the establishment of the native soil fungal community, “mycorrhizal network” (St. John 1999). The native fungal community at Debs Park has been seriously degraded by repeated disking and fire. In the restoration, native seeds or plugs (young plants) will be planted very close together to

develop an intertwined network of roots, thus forming a living barrier against exotic invasion (St. John, pers. comm. 01 Sept. 1999).

The project will include the following steps:

- 1) In September, identify 12 (9 + 3 control) plots of 20 x 20 m in the park to serve as test plots for the restoration project.
- 2) Search each carefully for pockets of native vegetation, which should be identified and protected by wire baskets or a similar method.
- 3) Soon after the first fall rain (October), use a gas-powered “weed-wacker” or machete to cut the emerging grasses and dead stalks on all but one plot.
  - a. If possible, use a controlled burn to singe the grasses on one plot
  - b. Grazing may also be employed, although this has been shown to encourage invasion by exotics, particularly thistles (E. Leong, pers. comm. 24 August 1999).
- 4) Nitrate immobilization
  - a. Spread the cut weeds on half the plots (including half of the burned one)
  - b. Spread a layer of leaf litter from nearby open-canopy walnut woodland on the other half (2 treatments per plot) (see Anderson 1996, St. John 1999).
- 5) Using a hand pick, chop small holes into the soil (through the layer of organic material (see # 4 above) a couple inches apart for planting (St. John, pers. comm. 01 September 1999).
- 6) Plant some plots with native grass<sup>a</sup> seed, and some with plugs, mixing both with native top soil taken from intact native habitat (e.g. open-canopy walnut woodland) elsewhere in the park to serve as mycorrhizal inoculation (St. John 1999)
- 7) If rains are erratic and the soil is noticeably drying out, water the plots moderately (St. John 1999).
- 8) Select a sample of the plots in which to pull any weeds that appear, but leave several plots to develop naturally.

<sup>a</sup> Initial plantings should rely primarily on California Brome (*Bromus carinatus*) a good “network-builder” (St. John, pers. comm. 01 Sept. 1999). Other native grasses, such as Purple Needlegrass (*Nassella pulchra*), may be added in future years. Coast Goldenbush (*Isocoma menziesii*) and Golden Yarrow (*Eriophyllum confertiflorum*) could also be employed early on, since they too are good at building networks. The seeds of all of these may be harvested at Debs Park during late summer.

*Expected Results:* The conversion of mustard and exotic grass to a mostly-native (e.g. >50%) patch of grassland (herbaceous species dominant) would be ideal. Although coastal sage scrub species (e.g. *Isocoma*) could be employed to help generate a native network of roots, the habitat that develops should be distinct from coastal sage scrub. Once a successful system is developed from test plots, larger test plots may be employed throughout the park where appropriate.

Species likely to benefit from grassland restoration include those that have little other habitat in the Los Angeles Basin, including Western Meadowlark (*Sturnella neglecta*), White-tailed Kite, Grasshopper Sparrow (*Ammodramus savannarum*) and Blue Grosbeak. Species such as Western Kingbird and Red-winged Blackbird would also be expected to breed at Debs, but these are

comparatively plastic in their habitat requirements and may do so now. The Common Ringlet Butterfly (*Coenomorpha tullia*) is a native grass obligate, and could be considered as an indicator of healthy grassland if it still persists in the landscape. Caterpillars of several other butterflies (often called the “grass skippers”) feed on native grasses, including both Woodland and Rural skippers (*Ochlodes sylvanoides* and *O. agricola*) (Mattoni 1990).

*Budget:* According to J. Anderson (pers. comm. via email, 09 July 1999), native grass plugs may be obtained for \$0.15/plug. Using the recommended 30,000 per acre, this could be done by volunteers at \$4500 per acre. Each volunteer could be expected to plant at most 100 plugs per hour. Other budgetary items (costs to be determined) will include herbicide and application equipment, grass-clearing tools, native grass seed, and native straw.

### Appendix 3. General planting guidelines

Debs Park serves as an invaluable storehouse of native vegetation in a highly urbanized area, and any manipulation of the habitat should reflect this. With the range of native species now available from wholesale native plant nurseries, there is no reason to continue planting exotics within the park.

The use of plant material of local origin (lower Arroyo Seco and adjacent Repetto Hills) should be done wherever possible, and a small nursery constructed on site will facilitate this (see above). We also recommend that any habitat restoration take into account the natural division of basic habitat structure as dictated by aspect and soil type in the Repetto Hills:

	<b>North - facing</b>	<b>South - facing</b>
<b>Coarser soil/Steep slopes</b>	Open-canopy Walnut Woodland	Coastal Sage Scrub
<b>Clay soil/Level slopes</b>	Open-canopy Walnut Woodland	Closed-canopy Walnut Woodland; Native Grassland

### Representative native plant species of Debs Park for restoration use (Wishner 1999)

*Recommended based on rooting potential and ability to resist invasion by exotics*

#### Walnut woodland components:

##### Trees/Large Shrubs:

Southern California Black Walnut (*Juglans californica*)

Coast Live Oak (*Quercus agrifolia*)

Toyon (*Heteromeles arbutifolia*)

##### Small Shrubs/Vines

Poison Oak (*Toxicodendron diversilobum*)

Fuschia-flowered Gooseberry (*Ribes speciosum*)

Heart-leaved Penstemon (*Keckiella cordifolia*)

Creeping Snowberry (*Symphoricarpos mollis*)

California False-Indigo (*Amorpha californica*)  
 Narrowleaf Bedstraw (*Galium angustifolium*)  
 Green Everlasting (*Gnaphalium californicum*)  
 Everlasting sp. (*G. stramineum*)  
 Goosegrass (*Galium aparine*)  
 Fiesta Flower (*Pholistoma auritum*)  
 Indian Milkweed (*Asclepias eriocarpa*)  
 Narrow-leaf Milkweed (*A. fascicularis*)  
 Fleabane Aster (*Erigeron foliosus*)

Coastal sage scrub components:

Large Shrubs:

Laurel Sumac (*Malosma laurina*)

Small shrubs

California Sagebrush (*Artemisia californica*)  
 Coyotebrush (*Baccharis pilularis*)  
 California Brickellbush (*Brickellia californica*)  
 Palmer's Goldenbush (*Ericameria palmeri*)  
 Golden Yarrow (*Eriophyllum confertiflorum*)  
 White Everlasting (*Gnaphalium canescens*)  
 Saw-toothed Goldenbush (*Hazardia squarrosa*)  
 Coastal Goldenbush (*Isocoma menziesii*)  
 Woolly Aster (*Lessingia filaginifolia*)  
 Wand Chicory (*Stephanomeria virgata*)  
 Prickly-Pear (*Opuntia xvasseyi*)  
 Deerweed (*Lotus scoparius*)  
 Black Sage (*Salvia mellifera*)  
 California Buckwheat (*Eriogonum fasciculatum*)  
 Wand Buckwheat (*E. elongatum*)  
 Sticky Monkeyflower (*Mimulus aurantiacus*)  
 California Fuschia (*Epilobium canum*)

Components of both walnut woodland and CSS:

Trees/Large Shrubs:

Mexican Elderberry (*Sambucus mexicanus*)  
 Chaparral Honeysuckle (*Lonicera subspicata*)  
 Holly-leaved Redberry (*Rhamnus illicifolia*)  
 Lemonadeberry (*Rhus integrifolia*)  
 Sugarbush (*Rhus ovata*)  
 California Coffeeberry (*Rhamnus californica*)

Small Shrubs/Vines

California Rose (*Rosa californica*) - near water  
 Golden Currant (*Ribes aureum*)  
 Mugwort (*Artemisia douglasii*) - near water  
 White Nightshade (*Solanum douglasii*)

Grasses/Forbs

California Brome (*Bromus carinatus*)  
 Purple Needlegrass (*Nassella pulchra*)  
 Giant Ryegrass (*Leymus condensatus*)

#### Riparian components

##### Trees/Large Shrubs

Red Willow (*Salix laevigata*)  
 Yellow (= "Black") Willow (*S. lasiandra*)  
 Mulefat (*Baccharis salicifolia*)

##### Small Shrubs/Vines

Mugwort (*Artemisia douglasii*)  
 Desert Wild Grape (*Vitis girdiana*)

#### **Appendix 4.** Exotic species of Debs Park

Exotic species may be ranked in terms of their threats to the native communities at Debs Park. These may be classified as "Priority I" and "Priority II" (after Hayduk and McGregor 1999, Wishner 1999). The most serious threats ("Priority I" taxa) include those that resist control efforts and dramatically alter the physical or biological aspects of native habitat (e.g. Tree-of-Heaven thicket replacing open grassland, or an inedible shrub replacing an edible shrub). These are species whose presence anywhere in the park (including developed areas) poses a serious threat to native habitat.

Representing less of a threat ("Priority II") are species that are less widespread and/or slower to invade, but that are still reducing the quality of native vegetation by reproducing in the park. Their removal is recommended from areas of native habitat, but is less of a priority for park-wide efforts.

Several species of exotic plants are not reproducing (= "naturalizing") and are apparently not seriously impacting native habitats. In some cases, their presence may actually be enhancing habitat for native wildlife, particularly in developed areas (including *Eucalyptus* spp. providing nest sites for raptors), and so are not included here.

##### *Priority I – Immediate removal recommended, park-wide*

Tree-of-Heaven (*Ailanthus altissima*)  
 Castor Bean (*Ricinis communis*)  
 Giant Cane (*Arundo donax*) - localized  
 Tumbleweed/Russian Thistle (*Salsola tragus*)  
 Tree Tobacco (*Nicotiana glauca*)  
 Bladder-flower (*Araujia sericofera*) – localized  
*Centranthus ruber* - localized

##### *Priority II – Removal recommended from natural areas and, where feasible, elsewhere*

Trees and large shrubs:

Shamel Ash (*Fraxinus uhdei*)  
 Chinese Elm (*Ulmus parvifolia*)  
 Cotoneaster (*Cotoneaster lacteus*)  
 Cherry (*Prunus* sp.)  
 Pyracantha (*Pyracantha* sp.)  
 Peruvian/California Pepper (*Schinus molle*)  
 Brazilian Pepper (*Schinus terebinthifolius*)  
 Victorian Box (*Pittosporum undulatum*)  
 Sydney Golden Wattle (*Acacia longifolia*)  
 Prostrate Acacia (*Acacia redolens*)  
 Italian Buckthorn (*Rhamnus alaternus*)

Common exotic subshrubs, grasses and forbs (see Wishner 1999 for complete list):

Periwinkle (*Vinca major*) Apocynaceae  
 Fennel (*Foeniculum vulgare*) Apiaceae  
 Algerian Ivy (*Hedera canariensis*)  
 Hall's Honeysuckle (*Lonicera japonica* 'Halliana') Caprifoliaceae  
 Cape Honeysuckle (*Tecomaria capensis*) Caprifoliaceae  
 Bur-chervil (*Anthriscus caucalis*) Apiaceae  
*Chenopodium murale* Chenopodiaceae  
 Tocalote (*Centauria melitensis*) Asteraceae  
 Bull Thistle (*Cirsium vulgare*) Asteraceae  
 Bristly Ox-tongue (*Picris echioides*) Asteraceae  
 Sow-thistle (*Sonchus* spp.) Asteraceae  
 Black Mustard (*Brassica nigra*) Brassicaceae  
 Short-pod Mustard (*Hirschfeldia incana*) Brassicaceae  
 Common Chickweed (*Stellaria media*) Caryophyllaceae  
 Spanish Broom (*Spartium junceum*) Fabaceae  
 Filaree (*Erodium* spp.) Geraniaceae  
 Horehound (*Marrubium vulgare*) Lamiaceae  
 Bermuda-buttercup (*Oxalis pes-caprae*) Oxalidaceae  
 Knotweed/Doorweed (*Polygonum arenastrum*) Polygonaceae  
 Exotic grasses (*Avena* spp., *Bromus* spp., *Vulpia myuros*) Poaceae

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