

CONCLUSION

ECOLOGICAL ISSUES RECOMMENDATIONS for RESTORATION and FURTHER RESEARCH in the BALDWIN HILLS

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HABITAT QUALITY

Three main natural vegetation communities are present in the Baldwin Hills, with coastal scrub being the most important. Fairly extensive areas of annual grasslands are also present, and riparian habitats are represented in some drainages by the shrubby growth of Arroyo Willow and Mule Fat. Although the exact nature and distribution of natural habitats within the Baldwin Hills prior to intensive human modification of the area cannot be reconstructed, it is evident from our study and the work of others that the major trends of habitat change have involved: loss or modification of coastal sage scrub, the near complete loss of an unknown extent of coastal prairie and native grassland, the channelization or other modification of natural drainages, and the purposeful or accidental introduction of a variety of exotic plant species. Most of these changes began in earnest with European settlement in the late 1700s and early 1800s, and accelerated with large scale land use changes in the region after the late 1800s. Extensive habitat modification accompanied livestock grazing, oil exploration and development, and urbanization through the 1900s.

Currently, more than 50% of the acreage of the Baldwin Hills has been transformed to urban land use. Of the approximately 485 hectares or 1,198 acres of open space that remain, a considerable percentage is either landscaped parkland within the KHSRA or is so heavily impacted by oil extraction activities that no functioning native habitat remains. However, relatively intact tracts of natural open space do exist and these support at least some of the expected native biota of the included habitats.

Of the natural open space in the Baldwin Hills, about 90 hectares or 222 acres (~20%) can be classified as coastal scrub, exhibiting various levels of disturbance or invasion by non-native plant species. Another 44 hectares or 108 acres (~9%) is best termed annual grassland; these areas (most of which were probably originally coastal scrub, although some might have originally been native grasslands) are structurally suggestive of natural perennial grasslands or

coastal prairie, but differ almost completely in species composition. Several small areas along natural drainages exhibit a modified riparian woodland best termed urban riparian; these exhibit a shrubby growth of Arroyo Willow and Mule Fat and most are probably maintained by non-natural water sources. Other very localized vegetation associations in the Baldwin Hills include hardpan clay soils which could potentially support some plant species characteristic of vernal pools (but lack the main vernal pool indicator plants), and cliffsides which support small populations of the succulent *Dudleya lanceolata*.

For all plant and animals groups examined, the current native biota of the Baldwin Hills represents a subset of that which occurred, or likely occurred, there historically. Much of the natural vegetation that once covered the Hills has been removed or modified as the landscape was converted for urban and industrial land uses. Introduced non-native species of plants have, in some cases, invaded the remaining natural areas to such an extent that they now predominate in many areas. These invasive species are particularly well adapted to anthropogenic disturbance, and thus possess superior competitive abilities over those of native species. In areas that have received high levels of continuous disturbance for long periods of time, introduced species have completely replaced native flora. Early descriptions of the area suggest that introduced mustards have been a component of the Baldwin Hills landscape since at least the early 1900s. Sections of coastal scrub that lie adjacent to landscaped parklands are adversely impacted by unnatural watering regimes; parkland maintenance has facilitated the dispersal of introduced plant species along drainages into downstream areas.

Introduced non-native animals are also now prevalent in the Baldwin Hills. The arthropod fauna, in particular, includes numerous abundant exotic species. The constant availability of water from artificial sources has allowed certain introduced insects, such as the Argentine Ant, to flourish. The reptile and amphibian fauna now commonly encountered in the Baldwin Hills is largely characterized by generalist species which can adapt to degraded habitats. However, many of these species (such as Black-bellied Slender Salamander, Common Kingsnake, Side-blotched Lizard) are only rarely encountered within the surrounding heavily urbanized lowlands.

Although some of the most commonly encountered birds are introduced species such as the European Starling and House Sparrow, the area still supports small populations of coastal scrub obligate species such as the California Quail, Bewick's Wren and Spotted Towhee. The apparent extirpation of other natural scrub obligates, such as the Cactus Wren and California Thrasher, has occurred just within the last few years. The mammalian fauna commonly encountered in the Baldwin Hills includes native and introduced species that adapt well to the presence of humans. Examples of such animals capable of exploiting food subsidies derived from proximity to man include opossums, skunks, house mice and fox squirrels. That a population of native Gray Foxes, an indicator species of natural scrub lands, persists in the Baldwin

Hills lends optimism for the area's potential for restoration, although fox populations may be unnaturally high due to the extirpation of the area's apex predator, the Coyote. The absence of Coyotes has also allowed the populations of other mesopredators such as skunks and feral cats to become unnaturally abundant.

No federal or state listed endangered or threatened species (California Department of Fish and Game 2000) were encountered in the Baldwin Hills although one, the State Endangered Peregrine Falcon (*Falco peregrinus anatum*;) is resident in the surrounding lowlands and undoubtedly occurs in the Hills on occasion. The Tricolored Blackbird (*Agelaius tricolor*), which does occur in the Baldwin Hills, has been identified by California Fish and Game as a Species of Special Concern (California Department of Fish and Game 1993). Other Species of Special Concern taxa that could potentially occur in the Baldwin Hills include the Pallid (*Antrozous pallidus*) and Western Mastiff (*Eumops perotis*) bats, and the Los Angeles Pocket Mouse (*Perognathus longimembris brevinasus*).

HABITAT CONNECTIVITY

While the natural plant communities (coastal scrub, annual grasslands, riparian) of the Baldwin Hills bear some resemblance to those of other natural areas in the region, the species composition of each community differs from location to location, owing to physical differences in soil type, slope aspect, moisture level and the type and level of disturbance experienced at a particular site.

Urbanization of the Los Angeles Basin has effectively isolated the natural areas of the Baldwin Hills from those of the surrounding area. The upland areas immediately south of the Ballona Wetlands were essentially contiguous with the Baldwin Hills prior to urbanization, being separated only by Centinela Creek. Intensive development of the Westchester Bluffs and the Fox Hills area of the southwestern Baldwin Hills, along with channelization of Centinela Creek and construction of the San Diego Freeway and other urban infrastructure, has severed the natural continuity of these upland areas. These changes, coupled with the concrete channelization of Ballona Creek, have also served to sever the natural relationship between the Baldwin Hills and the mouth of the Ballona Creek watershed of which they are a part.

Creative habitat linkages that increase connectivity between the Baldwin Hills and the Ballona Wetlands and adjacent upland areas (Westchester Bluffs) could potentially lessen this island effect for at least the more vagile species, such as birds and large mammals. Connectivity with upslope areas is thought to be an important element for the preservation of faunal diversity of associated wetlands (Zemba 1993).

Once these connections are lost, apex predators may no longer gain access to these often isolated and terminal habitats. This absence of predation pressure by large predators allow mesopredator populations to become unnaturally abundant. As a result many bird and small mammal populations suffer heavy rates of predation by populations of these smaller predators, such as foxes and feral cats. Should Coyotes persist in or be reintroduced into the Baldwin Hills, the animal diversity of Ballona Wetlands could perhaps also be enhanced by such a connection to the Baldwin Hills that facilitates the movement of these large predators between these two habitats.

Natural habitat connections to the more distant Santa Monica Mountains or Palos Verdes Peninsula would be desirable but less feasible. The fauna of the Baldwin Hills shows some similarities to that of these two other natural areas; for example, Cactus Wrens are resident in patches of prickly pear cactus on the Palos Verdes Peninsula and in the westernmost Santa Monica Mountains, as well as (until very recently) such habitats in the Baldwin Hills.

RESTORATION RECOMMENDATIONS

Ecological studies strongly indicate that larger and more contiguous tracts of habitat are more likely to retain biodiversity than smaller or more fragmented tracts (Soule et al. 1988), and that linkages between important habitat tracts are essential for the maintenance of this diversity (e.g. Swift et al. 1993). Therefore restoration prioritization should take into account not only the current condition of the habitat (and therefore the ease of restoration) but the need for linkages to connect habitat patches. In Fig. 12 we map coastal scrub restoration priorities for the Baldwin Hills. These priorities are based in part on the identification of key areas desired as habitat linkages; such priority habitat connectors are shown in Fig. 13.

Extensive areas of coastal scrub habitat are considered to be largely intact, and will require relatively little restoration work. Such limited work might include the elimination of landscaping water drainage, removal of invasive exotic plant species, and, where feasible, the implementation of natural fire regimes for habitat health.

Other areas of coastal scrub are recognized as being degraded, but have high restoration potential. These areas have some native plant cover and their soils largely intact; restoration of such areas is desirable because the potential for successful ecological restoration is high, and in some cases also because they can serve as linkages between other areas of existing natural habitat.

Still other tracts of coastal scrub are more highly degraded; these areas have little remaining native vegetation and the natural topography and soils have

been altered to varying degrees. Although restoration of such areas will be more difficult and labor-intensive, such restoration may be desirable for increasing the overall acreage of coastal scrub habitat and, especially, for providing connectivity between existing habitat tracts or, potentially, between the Baldwin Hills and a possible Ballona Creek wildlife corridor to the Ballona Wetlands.

Finally, extensive areas of open space in the Baldwin Hills have been so highly modified through grading and other damaging processes as to have little realistic restoration potential.

In setting priorities for habitat restoration in the Baldwin Hills, the following criteria have been defined:

Existing Habitat

- "Healthy" habitat dominated (by volume, number of individuals, and number of species) by native plant species expected within that habitat
- Soils and natural topographic conformation largely intact
- Habitat of sufficient extent that "edge effects" are reduced

Degraded Habitat With High Restoration Potential (Priority 1)

- Vegetation includes representatives of expected native species, but with considerable infiltration by non-native trees, shrubs, and/or annuals
- Soils and natural topographic conformation largely intact
- Habitat of sufficient extent that "edge effects" are minor or moderate

Degraded Habitat of High Restoration Priority (Priority 2)

- Vegetation overwhelmingly dominated by non-native species, or largely lacking
- Soils and natural topography may be highly modified
- Area is identified as an important linkage between two or more areas of existing healthy habitat or habitat with high restoration potential; as such, some degree of restoration of the degraded habitat can function to increase size and connectivity of natural areas

Degraded Habitat With Some Restoration Potential (Priority 3)

- As above (Priority 2), and with some restoration potential, but not identified as being of importance for habitat connectivity

Highly Degraded Area With Little Restoration Potential (Lowest Priority)

- Currently unvegetated or vegetated only with non-native species or landscaping
- Generally not adjacent to existing healthy habitat or areas with high restoration potential

In some cases tracts of existing healthy habitat or areas with high restoration potential are separated by landscaped areas within KHSRA (Fig. 13).

Such landscaped areas may be effective dispersal routes for many animal species, but this bears future monitoring; the possibility of restoring some of these landscaped areas with native vegetation should be considered.

MESOPREDATOR CONTROL

It is extremely important to reduce the suite of mesopredators, particularly non-native species, within the Baldwin Hills. Populations of terrestrial birds, small mammals, and reptiles and amphibians cannot survive continued pressure from unnaturally high populations of such predators. The active removal of feral cats and dogs is essential, as is a public awareness campaign encouraging pet owners to keep cats indoors and to reduce the subsidy (through provision of food) to other predators such as skunks, foxes, raccoons and opossums. Because Coyotes can provide a natural control of these mesopredator populations (Soule et al. 1988), the active reintroduction of this top carnivore to the Baldwin Hills should be considered.

FURTHER RESEARCH AND MONITORING RECOMMENDATIONS

The success of the efforts to protect and restore habitat suggested above will need to be gauged, and therefore a program to monitor the biota of the Baldwin Hills is recommended. Such monitoring should include ongoing analyses of vegetation structure and species composition, and focused studies of specific groups of organisms. Many of these studies might be achieved with the collaboration of natural history interest groups (such as the California Native Plant Society and the Audubon Society) and/or college and university faculty and students. Such studies can also provide unique and rewarding educational opportunities and local community involvement. Educating the public about natural plant and animal communities could promote increasing recognition of and protection of the natural habitats within the Baldwin Hills.

Particularly valuable is regular monitoring using standardized, repeatable techniques; such techniques vary with discipline, but might include: avian point counts or MAPS ("Monitoring Avian Productivity and Survival") stations, periodic small mammal trapping efforts, standardized reptile and amphibian surveys, monitoring of road kills through cooperation with municipal and county animal control agencies, ongoing insect sampling, and vegetation transects through preserved and restored areas to monitor changes in plant cover and species composition. More intensive ecological and behavioral studies, such as the monitoring of movements of larger mammal species through habitat corridors and linkages using photography or telemetry, may also be warranted.

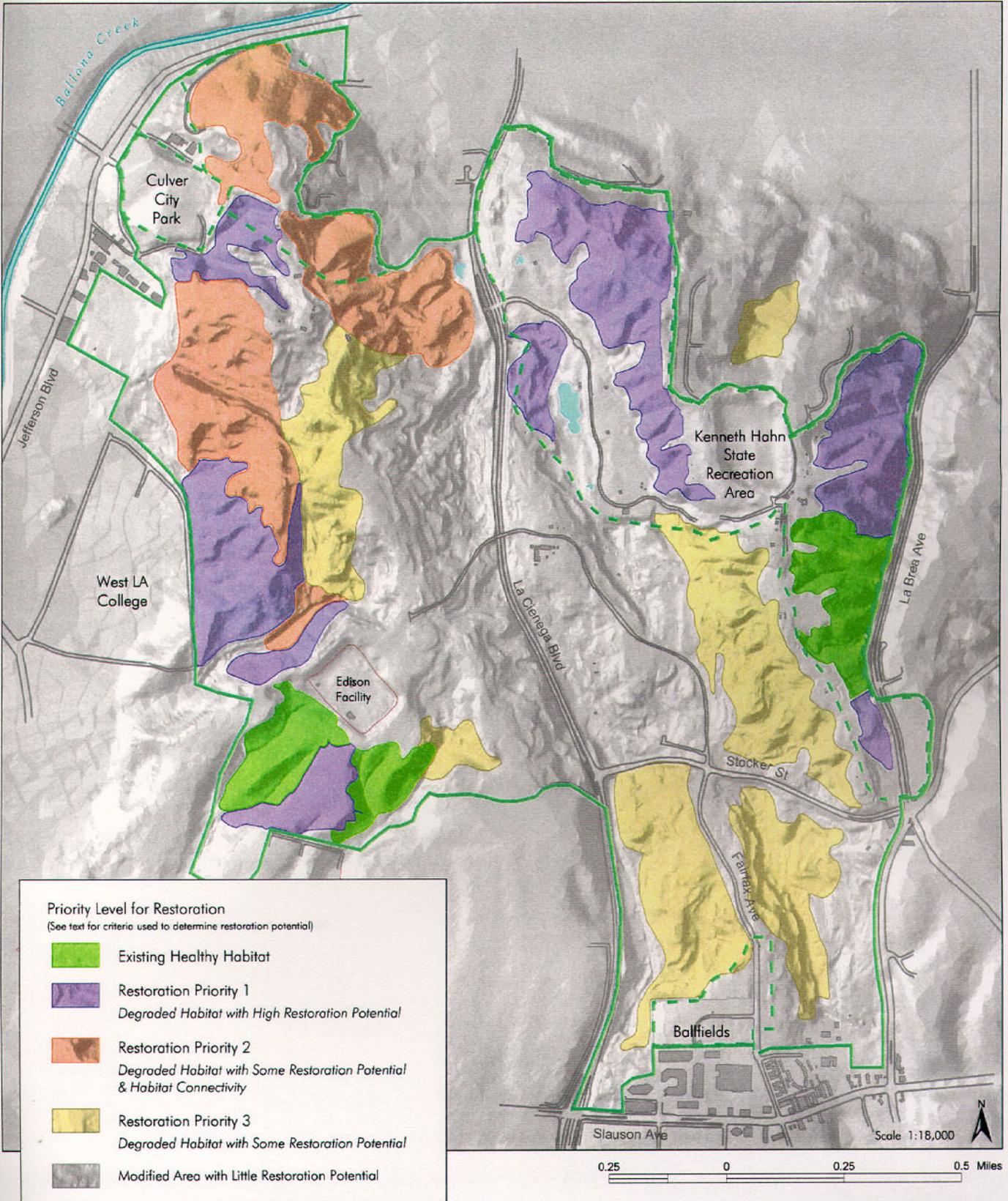
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LITERATURE CITED

- California Department of Fish and Game. 1993. Species of Special Concern. Wildlife Management Division, Nongame Bird and Mammal Section.
- California Department of Fish and Game. 2000. State and Federally Listed Endangered and Threatened Animals of California. Habitat Conservation Division, Wildlife and Habitat Data Analysis Branch.
- Soule, M. E., D. T. Bolger, A. C. Alberts, R. Sauvajot, J. Wright, M. Sorice and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral requiring birds in urban habitat islands. *Conservation Biology* 2: 75-92.
- Swift, C., A. Collins, H. Gutierrez, H. Lam and I. Ratiner. 1993. Habitat linkages in an urban mountain chain. Pp. 189-199 *in* Interface Between Ecology and Land Development in California, J. E. Keeley, ed. Southern California Academy of Sciences, Los Angeles.
- Zemba, R. 1993. The need for corridors between coastal wetlands and uplands in southern California. Pp. 205-208 *in* Interface Between Ecology and Land Development in California, J. E. Keeley, ed. Southern California Academy of Sciences, Los Angeles.

Habitat Restoration Priorities



Priority Habitat Connectors

