

Natural and Restorable Fragments of the Former El Segundo Sand Dunes Ecosystem

Rudi Mattoni

Lepidoptera Research Foundation, 9620 Heather Road
Beverly Hills, CA 90210
Tel. (310) 274-1052; Fax (310) 275-3290

Abstract. The El Segundo sand dunes ecosystem includes two major communities that are distinct and unique: the sand dunes proper and the Los Angeles coastal prairie. The dunes are highly degraded and the prairie is virtually destroyed. Several fragments of the dunes have survived as open space, the largest of which is in the process of restoration. Three disjunct open space fragments of coastal prairie survive, but only one will probably be preserved. Both communities were inhabited by a number of endemics including at least 11 species found nowhere else.

Keywords: Conservation; El Segundo sand dunes; endangered species; grassland restoration; Los Angeles coastal prairie; sand dune restoration; urban ecology.

Introduction

The El Segundo sand dunes ecosystem, located west of the city of Los Angeles, is a dune system composed of sand deposited since the beginning of the last interglacial period, about 100,000 years ago. The deposits were laid down during two separate episodes, the last interglacial period from about 100,000 to 20,000 years ago (Pleistocene) and the recent (Holocene) over the past 8,000 years, after the sea level reached its current eustatic position (Cooper 1967). The Pleistocene deposits were consolidated into weak sandstone, whereas the recent sand is free flowing and easily moved by wind and water erosion.

The recent dunes are immediately inshore from the coast. The older dunes extend inland from the lee toe of the recent dunes and also underlie them. The cemented sands were eroded to form a gentle undulating plain with a number of depressions. Ephemeral pools of water formed in the depressions following spring rains. In places free-flowing sand collected in the depressions, producing a mosaic of varying soil conditions. The old dunes provided the substrate of what I refer to as the Los

Angeles coastal prairie. A map of the historic extent of both the dunes and prairie is given in Figure 1 and a diagrammatic cross section in Figure 2.

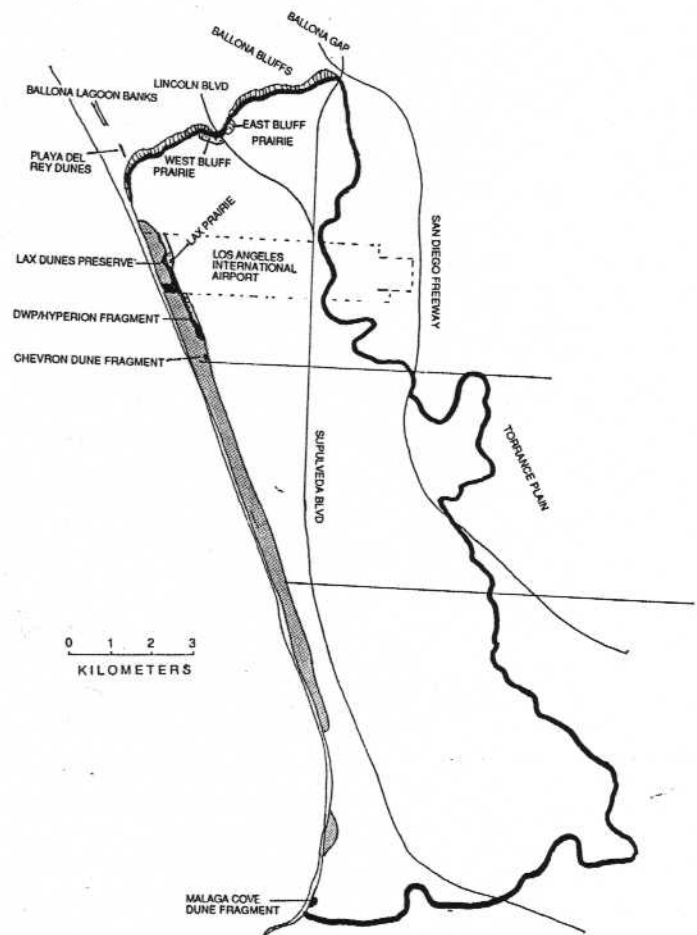


Figure 1. El Segundo sand dunes. Pleistocene dunes outlined by heavy line. Recent (Holocene) dunes stippled. Major present-day structures shown for orientation.

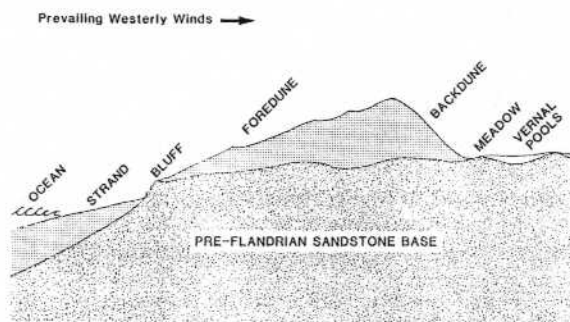


Figure 2. Diagrammatic cross-section of the El Segundo sand dunes and coastal prairie.

The two substrates, although both assay 97% sand, nevertheless present very different environmental conditions to which their biotic communities are adapted. The free sand of the dunes may be either removed or added, at the rate of several millimeters in a few hours, about the stems of growing shrubs, and seeds may be either buried or uncovered. Aeration is high, while surface soil moisture is low and rapidly lost. Organisms adapted to life in free sand, but unable to successfully compete elsewhere, are referred to as sand obligate species. To illustrate the different properties of the two habitats, Table 1 lists pairs of congeneric annual plant species found respectively on dunes and prairie.

A systematic study by W. D. Pierce and his colleagues during 1938-1939 (unpublished notes, Los Angeles County Museum of Natural History; and Mattoni 1990 references) provided the bulk of information on the historical biota of the dunes, this work having been largely done on what is now the Los Angeles International Airport (LAX). A few earlier collections and studies augment Pierce (see Barbour and Johnson 1988, Mattoni 1990). The first known impact on the ecosystem was by agriculture 150 years ago, long before any studies. Urban development started about 100 years ago, with the greatest habitat destruction over the past 40

Table 1. Segregation of congeneric species pairs and one triplet among the dunes and prairie communities at Los Angeles International Airport

Dunes	Prairie
<i>Lepidium lasiocarpum</i>	<i>L. nitidum</i>
<i>Cryptantha clevelandii</i>	<i>C. intermedia</i>
<i>Camissonia lewisii</i>	<i>C. bistorta</i>
<i>Phacelia cicutaria hispida</i>	<i>P. douglasii</i>
	<i>cryptantha</i>
	<i>P. distans</i>
<i>Calandrinia maritima</i>	<i>C. ciliata</i>

years. Based on Pierce's study, it is estimated that the numbers of native species lost from the system are: 34 of 94 flowering plants, 20 of 23 mammals, 11 of 19 reptiles and amphibians, all five of the scrub obligate birds, and 7 of 31 resident breeding butterflies. Additional comparative numbers would probably be similar had historical sampling of other invertebrate groups been more thorough.

This paper defines some unique characteristics of both prairie and dunes components of the ecosystem, the status and identities of the remaining fragments, and some attitudes and interactions among the variety of concerned special interests directed towards either further destruction or a multiplicity of "restoration" approaches.

The Los Angeles Coastal Prairie

The historical 5,000 ha (12,500 ac) coastal prairie had, by 1992, been almost completely destroyed, with only 0.6% remaining as open space. The historical presence of the community was not recognized heretofore and the area was formally classified as coastal sage scrub by Kuechler (1988). USDA soil survey maps show the Oakley sand substrate of the Pleistocene dunes is surrounded by loam and clay soils. The latter supported a coastal sage scrub community. Degraded remnants of the earlier contiguous scrub can be found on the Ballona bluff slope, the Baldwin Hills and parts of Palos Verdes peninsula. Both coastal dunes and prairie were thus isolated for nearly 10,000 years in a sea of sage scrub. In this isolation two unique biotas could evolve. In addition to the restricted endemic taxa, community compositions were unique. No comparable coastal grassland is known in southern California.

Based on notes, archival photographs, and persistent species, the prairie can be characterized with some certainty. The dominant perennial was *Stipa cernua* with *Lotus scoparius* and *Croton californica* the most abundant subshrubs, and *Camissonia chieranthifolia* a common groundcover. The latter two sand obligate species are only found in pockets of free sand. The only common native annual grass is *Festuca megalura*, and the only other grasses are *Bromus arizonicus*, *Elymus triticoides*, and possibly *Orcuttia californica*. The latter vernal pool species was actually taken in the Gardena area, but the presence of substantial vernal pool habitat across the dunes suggests it was probably present. Other annuals associated with vernal pools included *Plantago erecta*, *Linathus dianthiflorus*, *Orthocarpus purpurascens*, and *Astragalus tener titi* these were extirpated. One abundant annual seen in a close up photograph taken in July 1938 was *Chorizanthe californica* ssp., the population of

