

Vegetation Change on the Palos Verdes Peninsula with Special Reference to the Portuguese Bend East Parcel

Daniel Flores, Alexandra Lunan, Brian Arredondo, Jin Young Choi, Jason Hazel, Dr. Chris Lee, Dr. Paul Laris, Siegrun Storer, Ray Sumner, Carlos Takashima
California State University Long Beach



Introduction

In summer 2008, the Geosciences Diversity Enhancement Program (GDEP) group began research on lands managed by the Palos Verdes Peninsula Land Conservancy (PVPLC) to gain further understanding of the coastal sage scrub habitat. Coastal sage scrub is a rare habitat type occurring on California's coastal terraces and foothills below 1,000 feet. It is characterized by low, aromatic, drought-deciduous species of shrubs such as black sage (*Salvia mellifera*), purple sage (*Salvia leucophylla*), California sage (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), bush sunflower (*Encelia californica*), toyon (*Heteromeles arbutifolia*), lemonade berry (*Rhus integrifolia*), and other shrubs (Source: World Wildlife Fund). The Southern California coast has been home to scrub and chaparral for millennia. Our investigations included and assessment of re-vegetation with native coastal sage scrub species in areas which had previously been plowed. The effects of fire were also examined, and the relative proportion of native to non-native species were determined through field work and aerial photo interpretation.

Portuguese Bend East Study Area



Figure 1. Portuguese Bend East Study Area.

Methods and Materials

While in the lab, we used aerial photographs and satellite imagery from 1928 to 2007 to study vegetation changes in areas managed by the PVPLC. The Portuguese Bend East parcel was chosen for closer investigation, including field survey. With the use of computer programs, such as ArcGIS and ERDAS Imagine, we were able to study and compare several areas that had historically been plowed. Five sites within the parcel zone, which are known to have been plowed several times, were delineated. Field work included plant measurement, photography, GPS waypoint collection, transects, and estimation of native and non-native species cover.

References

Hierl, Lauren A. et al., 2008. Assessing and Prioritizing Ecological Communities for Monitoring in a Regional Habitat Conservation Plan. Environmental Management, 42:165-179.
Minnich, Richard A. and Raymond J. Dezzani, 1996. Historical Decline Of Coastal Sage Scrub In The Riverside-Perris Plain, California. Western Birds 29:366-391.
Moyes, Andrew B., 2005. Restoration of Native Perennials in California Annual Grassland after Prescribed Spring Burning and Solarization. Restoration Ecology Vol. 13, No. 4, pp. 659-666.
O'Connell, M. W. and Richard A. Erickson, 1998. An Example Of The California Gnatcatcher Nesting In Restored Coastal Sage Scrub, Western Birds 29:434-438.
World Wildlife Fund, www.worldwildlife.org, accessed 08/01/08.

Results

1963

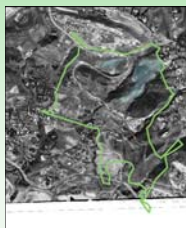


Figure 2. 1963 aerial photograph of the Portuguese Bend East (outlined in green) with disturbed areas shown in blue.

1972

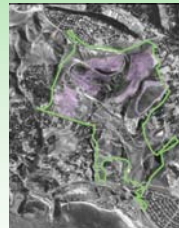


Figure 3. As you can see from the previous photograph, more areas appear disturbed in the 1972 image (shown in purple).

1980

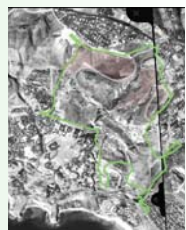


Figure 4. 1980 satellite image. Very little vegetation grew back in study sites #4 and #5. Less area was still being plowed. (shown in red)

2006

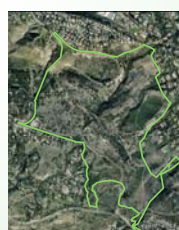


Figure 5. 2006 satellite image shows study sites several years after plowing had ceased.



Figure 6. Picture of study area site #3, shows, plowed areas and large stands of lemonade berry. (Photograph courtesy of Siegrun Storer).

Discussion

The study area resembles other regions of coastal sage scrub where grazing, agriculture, urbanization, and fire have affected coverage density leading to an increase of grasses, specially non-native annuals (Minnich and Dezzani, 2008). The coastal sage scrub (CSS) has been recognized as the highest priority habitat for monitoring and conservation because of it's decreasing extent, uniqueness, fragmentation, and species endangerment (Hierl, 2008). Restoration of coastal sage scrub became imperative as habitat for the endangered California Gnatcatcher (*Poliopitila californica*), and has been successfully carried out in Orange County (O'Connell, 1998) and on PVPLC lands. It has been shown that controlled spring burning is not a successful method of removal of non-native annual species, especially mustard (Moyes, 2005), which is dominant on much of the formally plowed land on the Palos Verdes Peninsula. In the Portuguese Bend East study area there was evidence of re-growth of CSS species, especially lemonade berry (*Rhus integrifolia*) and bush sunflower (*Encelia californica*) in addition to large areas of acacia (*Acacia* sp.), mustard (*Brassica nigra*), and fennel (*Foeniculum vulgare*). In contrast to previously plowed lands, steep slopes which have never been plowed show a mixture of native species, predominantly lemonade berry (*Rhus integrifolia*) and California buckwheat (*Eriogonum fasciculatum*).

Native and Non-Native Species in Order of Frequency

Study Sites	Native Species (In Order Of Frequency)	% Cover	Non-Native Species (In Order of Frequency)	% Cover
#1	<i>Baccharis pilularis</i> <i>Rhus integrifolia</i> <i>Heteromeles arbutifolia</i>	10	<i>Brassica nigra</i> <i>Centaurea melitenensis</i> <i>Schinus terebinthifolius</i> <i>Avena</i> sp.	90
#2	<i>Rhus integrifolia</i> <i>Encelia californica</i>	2	<i>Foeniculum vulgare</i> <i>Brassica nigra</i> <i>Avena</i> sp.	98
#3	<i>Rhus integrifolia</i> <i>Eriogonum fasciculatum</i> <i>Salvia mellifera</i> <i>Salvia leucophylla</i>	99	<i>Centaurea melitenensis</i>	1
#4	<i>Artemisia californica</i> <i>Encelia californica</i> <i>Rhus integrifolia</i> <i>Baccharis pilularis</i> <i>Heteromeles arbutifolia</i>	30	<i>Brassica nigra</i> <i>Foeniculum vulgare</i> <i>Schinus terebinthifolius</i> <i>Centaurea melitenensis</i>	70
#5*	<i>Rhus integrifolia</i> <i>Opuntia littoralis</i>	70	<i>Brassica nigra</i> <i>Foeniculum vulgare</i> <i>Acacia</i> ps.	30

Plowing and Fire in the Portuguese Bend East Parcel

Plot	1928	1945	1956	1963	1972	1973 (Burn)	1980	1994	2006
1	X	X	X	X	X	X	X	-	-
2	X	X	X	X	X	X	X	-	-
3	X	-	-	-	-	-	-	-	-
4	X	X	X	X	X	X	X	-	-
5	X	X	X	X	X	X	X	-	-

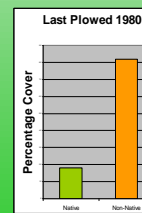
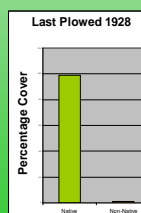


Figure 7. Daniel Flores taking notes about his site. (Photograph courtesy of Siegrun Storer).



Figure 8. Group listening to Dr. Paul Laris while working with GPS units. (Photograph courtesy of Jason Hazel).

Acknowledgments

We would like to thank the National Science Foundation for funding this project (award number 0703788), Ann Dalkey of The Palos Verdes Peninsula Land Conservancy for her time and input, Joel Rojas of the City of Rancho Palos Verdes, Greg Armento of the CSULB Library, Marjanne Binn of the Palos Verdes Library for her help with historic information and photos, Paul Laris for teaching us and helping in MANY ways, Brian Nagy for his geospatial knowledge, Eric Zahn for his plant knowledge, Gregory Ziolkowski for helping to edit this poster, and Diane Escobedo for all of her logistical support.

Thank you! We could not have done it without you.